Industrial

July 1945

Standardization

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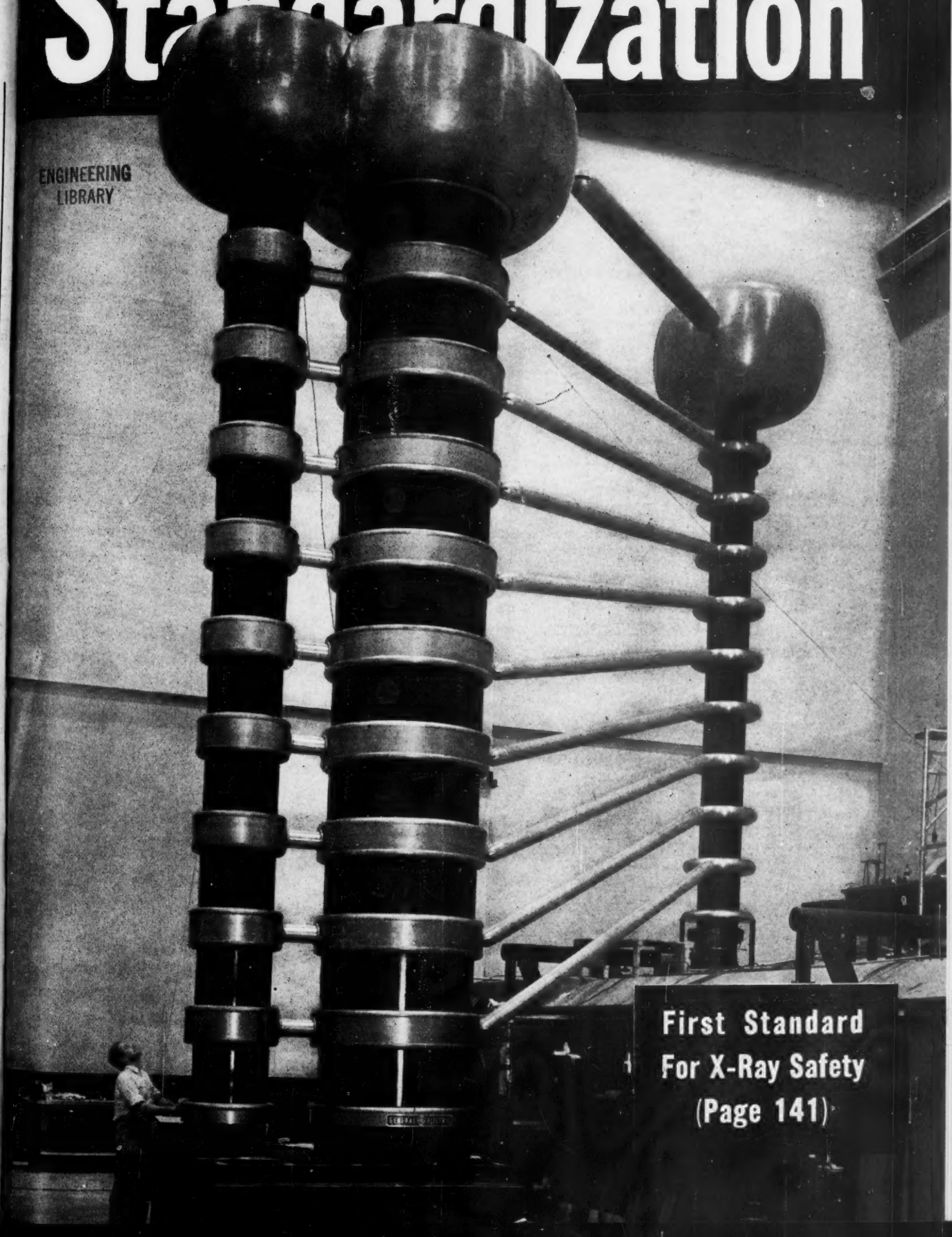

First Standard
For X-Ray Safety
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Company Members—

Some 2,000 Industrial concerns hold membership either directly or by group arrangement through their respective trade associations

Readers Write

Congratulations on Acme Threads

Crane Company

Dear Mr. Gaillard: I have been impressed with the accomplishment of this War Committee [on Acme Threads], as the project was not an easy one and differences of opinion added to the problems.

A. M. HOUSER

Drawings and Drafting Practice

J. I. Case Company

Gentlemen: This department is very much interested in the project announced in the March issue of INDUSTRIAL STANDARDIZATION on drafting room practice. We have long felt the need of some such practice for our engineering departments, but up to the present time we have not compiled anything on this subject, as we have had very little information available.

E. J. MAUER
Standards Department

Color

Signs of the Times

Dear Miss Mason: Can you tell me where I might discover some authoritative information on color standards? If this has not been attempted by your organization or by the National Bureau of Standards, do you have information as to color standards used by various other industries than the Outdor Advertising Association and the Porcelain Enamel Institute?

KEN BELL,
Editorial Department

• • The American War Standard Specification and Description of Color, Z44-1942, gives this information. Articles on color standards were published in INDUSTRIAL STANDARDIZATION in November 1941; December 1942; October 1943; April 1944; and September 1944.

Thanks to the ASA Library

Federal Telephone and Radio Corp.

Gentlemen: Some days ago you were good enough to lend Mr. Bungerz your information copy of "Din-Normblatt Verzeichnis-Herbst-1940." Please accept our thanks for this valuable loan and for the courtesies extended to our engineers during their visits to your office.

L. B. HAIGH
Production Line Manager

Quality Control for Palestine

American Economic Committee For Palestine, Inc.

Gentlemen: Kindly forward to us American War Standard Control Chart Method of Controlling Quality during Production, Z1.3-1942. This Committee maintains libraries open to the public free of charge both in New York and in Palestine. The technical books which we purchase are being transmitted to

(Continued)

our Technical Library in Palestine where they are available to those interested in consulting them.

ELIEZER SCHALIT

Building Codes

Department of Public Works
Kansas City, Missouri

Gentlemen: In the preparation of the new Kansas City Building Code we have referred frequently to American Standards as adopted by the American Standards Association.

SHANNON MERIWETHER
Assistant City Engineer

Electronics and Abbreviations

The American Society of Mechanical Engineers

Dear Miss Mason: Many thanks for Mr. Amatneek's letter on abbreviations. I am filing this material with other comments and suggestions. Undoubtedly recent increase in electronics literature will make necessary a careful study of abbreviations relating to that subject the next time the standard is revised.

GEORGE A. STETSON
Editor

Safety for Tent Shows

Town of Rotterdam,
Schenectady, N. Y.

Gentlemen: The Town Board directed me to communicate with you for your advice on methods used in fireproofing tents and other fabricated material used by tent shows and carnivals for the purpose of enacting regulatory measures for the protection of life and property in our township. I should like to ask you also whether or not you have issued any mark or symbol showing inspection by your laboratory or firm of materials which may be used by tent shows, similar to the Underwriters' label.

ANTHONY P. LUCAS
Rotterdam Town Attorney

• • A draft of a proposed standard on which an ASA committee is now voting was sent to Mr. Lucas. The membership of the committee includes representatives of shows and carnivals, public officials, and others interested in measures affecting the safety of the public. The American Standards Association does not operate a testing laboratory and is not in the business of commercial testing.

The Front Cover

An x-ray current of 25 milliamperes at 1,400,000 volts can be produced by this huge x-ray generator unit at the National Bureau of Standards. The voltmeter is encased in the small column to the left. The colume on the extreme right is one of the three x-ray tubes which are used for standardizing dosage meters and for exploratory work and cooperative studies with the National Cancer Institute.

The main hall of this laboratory is 65 by 132 feet with a clear height of 60 feet.

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July, 1945 Ruth E. Mason, Editor 35 Cents

Standardization is dynamic, not static. It means not to stand still, but to move forward together.

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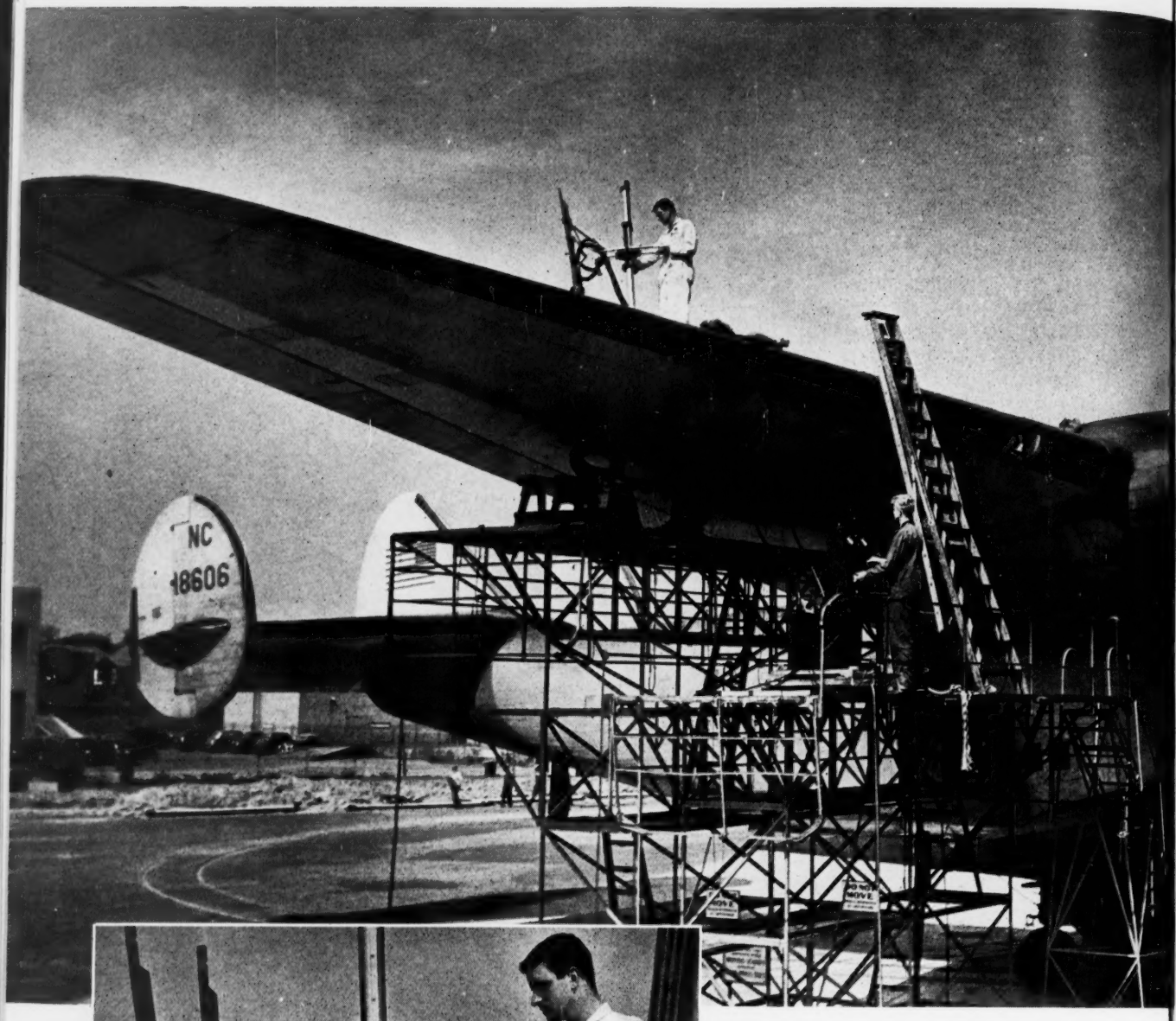


Using x-ray as a routine check on an airplane wing before this clipper is sent out on its transatlantic run.

Above—A mechanic adjusts the portable x-ray unit on the wing as a second man places the photographic plates under the wing. The third man, at the controls, will turn on the current after the adjustments have been made and the two mechanics have retired to the safe distance outside the range of dangerous radiation. (This operation saves the many manhours formerly required in taking the wing apart to discover suspected failure in wing structure.)

Below—Close-up of the portable x-ray unit shown on the wing above.

First Standard for X-Ray Safety

By George Singer

X-ray tests of materials are required in the manufacture of nearly all war equipment, using volts ranging from 4,000 to 2,000,000 and even higher. Part I of the American War Standard Safety Code for the Industrial Use of X-Rays tells how to determine whether an x-ray installation is safe.

THE purely scientific uses of x-rays have to do chiefly with investigations of the nature of the radiation itself. Aside from this use, x-rays have important applications in two different fields. The first of these is Medicine in which it serves both as a diagnostic tool and as a therapeutic agent. The second is Industry in which it has found many different and interesting applications and holds further promise of many more in the near future.

In reporting his discovery of x-rays in 1895, Roentgen foreshadowed both applications. Of the two radiographs included in his original paper, the first shows "the bones in the fingers of the living hand"—complete with a ring on the third finger—and the second shows the internal structural details of "a compass card and needle completely inclosed in a metal box." He mentions also a radiograph "of a piece of metal where the x-rays show the want of homogeneity."

In thus supplying his discovery, Roentgen became the first industrial radiographer. However, the possibilities of Roentgen's discovery were first generally recognized and applied by the medical profession, to reveal the internal structure of the human body and to destroy abnormal tissue. The therapeutic use of x-rays followed naturally from early observations that prolonged exposure to x-rays resulted in such superficial effects as the reddening of the skin and the falling out of hair exposed to the new radiation. That overexposure to x-rays could have more serious consequences to health soon became apparent; but not before a number of pioneers working both in medicine and in physics suffered serious deformities and, in not a few cases, death. The degree to which these harmful effects are produced was found to depend not only upon the nature of the radiation itself and length of exposure, but also upon the susceptibility of the tissue or organ irradiated.

George Singer, *chairman of the ASA War Committee on Industrial X-Ray Protection, Z54, is a member of the staff of the National Bureau of Standards.*

The x-ray protection problem in medicine, unlike that in industry, must concern itself not only with the protection of the operator but must provide protection for the patient as well. To fulfill this need, methods of measuring x-ray dose and quality and of providing adequate protection were investigated and applied. In their essentials these methods consist of: (1) Keeping as great a distance as possible between the source of radiation and all persons in its neighborhood; and (2) Interposing protective barriers or shields between the source of radiation and all persons in its neighborhood when full advantage cannot be taken of the possibilities of protection through distance alone.

In recognition of the urgent need for such information the American Advisory Committee on X-Ray and Radium Protection was formed for the purpose of preparing a uniform set of safety recommendations. These were first published in 1931 as National Bureau of Standards Handbook HB-15 under the title, *X-Ray Protection.* In 1936, the recommendations were revised and were reissued as Handbook HB-20 of the National Bureau of Standards. Further revision of these recommendations has had to be postponed for the duration of hostilities.

Although these recommendations have no official or legal status, they have been widely accepted by the medical profession, by the manufacturers of x-ray equipment, and by insurance interests, and have in effect served the purpose of an x-ray safety standard. As protection problems presented themselves to industry, Handbook HB-20 came to serve also as a source of safety information in this field of application as well. The usefulness of this handbook to industry declined, however, as specialized apparatus was developed for industry and as industrial techniques diverged progressively from similar applications in medicine.

However, because of this backlog of experience in x-ray protection, the

The first part of the Safety Standard for the Industrial Use of X-Rays has been approved as an American War Standard and is now available as Z54.1-1945, Part I.

The committee which developed the code was approved in June, 1944, and held its first meeting in November, 1944. A number of its members have had many years of experience in connection with safety problems in the field of medical x-rays and others have pioneered in the applications of x-rays to industrial problems. Because of this combined experience it was possible for the committee to produce the first part of this safety standard in a comparatively short time.

Much of the work is new material developed by the committee where none existed before. The standard is intended to be used wherever x-rays are being utilized in industry, especially in connection with the war effort. It will eventually form the basis for a peacetime standard.

Approved for publication by the National Bureau of Standards.

problem of developing the present American War Standard was very much simplified and the time required for its preparation was considerably shortened.

The industrial application of x-rays lagged behind developments in the medical field until the powerful and rugged x-ray apparatus and accessories needed in industry became available as the result of advanced electronic research and engineering.

Only a very limited use was made of x-rays during the First World War. The inspection of the wood then used in the construction of aircraft struts, and the examination of parcels for contraband, are typical of the uses to which x-rays were put.

Increasing Industrial Use of X-Ray

Since then the industrial applications of x-rays have increased in number and in kind. The recent sensational growth had its beginning about the time American industry was tooling up in preparation for its magnificent contribution to the present war. This was preceded by an interval of slow and steady development in which the basic industrial techniques were firmly established.

Being a powerful non-destructive method of inspection, x-ray is used in the industrial engineering laboratory in studying new methods of production and in the assembly line in determining whether the finished article is up to the required standard. X-rays serve industry in so many capacities that only a few can be noted.

X-radiation is used in the visual examination of all kinds of materials piece by piece, in bulk, or packaged, that must be inspected for internal defects, foreign matter, damage, positioning of parts, loose parts, etc. Candies, fruit, vegetables, and berries are inspected, in bulk and packaged, for foreign material; potatoes, carrots, onions, etc. are inspected for hollow hearts. Oranges, lemons, tangerines, grapefruit, and limes are inspected whole, for frost damage. Meat and meat products, oysters, and clams are examined for foreign material. Shoes are inspected for positioning of nails and for degree of fit; wire and cable, for centering of and breaks in conductors. Rubber heels, tires, and various rubber parts are inspected for undesirable inclusions and to determine whether the positioning of inserts is satisfactory. Plastics are examined to determine whether the harmful metal particles have been incorporated into it in processing. Storage batteries are inspected for metal inclusions in the wooden separators; fuse and cartridge assemblies for broken parts, loose connections, etc. This is a partial list only.

Other radiographic applications of x-rays are: Inspection of ferrous and non-ferrous castings for shrinkages, cavities, dross, inclusions, cracks, gas pockets, and for quality control; inspection of welds of various kinds, for cracks, gas inclusions, incomplete fusion, slag inclusions, and for overall quality control; inspection of plastics, powder sticks, cables and assemblies of all sorts for defects, inclusions, inhomogeneities, loose parts, positioning.

The following is a partial list of the uses to which industry has put modern x-ray diffraction methods: The determination of the composition and structure of alloys; the effects of rolling and working of metals and alloys; the effect of annealing and other thermal treatments of metals; the determination of crystal structure and orientation; the measurement of crystal size; determination of uniformity and depth of surface hardening; the chemical analysis of paints, pigments, ceramics, glass, cement, rubber, fiber, and many other substances.

By taking two radiographs of an object with the x-ray source in slightly different positions, a stereoscopic view of the object can be obtained if both films are viewed simultaneously with a conventional stereoscopic viewer. The three-dimensional effect of the internal structure of a solid object which can be achieved in this way can be startlingly real. Not only is it possible to take x-ray moving pictures of moving objects, but high-speed x-ray photography is possible of a rapidly moving object, such as a bullet in passage through a gun barrel or into armour plate.

During the present war, this has become a routine research tool in ordnance development, more powerful than the corresponding photographic technique using light rays in the visible spectrum.

In the aircraft industry thousands of manhours are saved daily through the use of x-ray photo-copying methods permitting accurate reproduction of large numbers of templates.

X-rays are also being used extensively in the inspection, testing, and

The ASA War Committee which is preparing the standards to protect industrial workers using x-ray includes members from industry, from the medical profession, insurance companies, manufacturers of x-ray equipment, as well as representatives of labor and of the Army and Navy. They are:

George Singer, National Bureau of Standards, U. S. Department of Commerce, *Chairman*
E. C. Barnes, Westinghouse Electric Corporation
Capt C. F. Behrens, Bureau of Medicine and Surgery, U. S. Navy (Lt Comdr R. K. Arbuckle, *Alternate*)
R. P. Blake, Division of Labor Standards, U. S. Department of Labor
C. B. Braestrup, Department of Hospitals, City of New York
Bureau of Ships, Code 350, U. S. Navy
Dr E. E. Charlton, General Electric Company
Lt Col G. R. Ensminger, Ordnance Department, War Department
M. B. Evans, American Industrial Radium and X-Ray Society, Inc
Dr. G. Failla, Radiological Research Laboratory, Columbia University
Dr Albert S. Gray, State Department of Health, Connecticut
A. Kidd, The M. W. Kellogg Company
Leo C. Kotraschek, Picker X-Ray Corporation (G. B. Myers, *Alternate*)
Dr H. H. Lester, Laboratory, Watertown Arsenal
Dr Earl F. Lutz, General Motors Corporation
Lt John W. Meigs, Medical Corps, U. S. Army
Dr R. R. Newell, Department of Roentgenology and Radium Therapy, Stanford University School of Medicine
S. L. Newman, International Associaton of Machinists, A F of L
Dr S. J. Nilson, The Fidelity and Casualty Company of New York (M. J. Pitre, *Alternate*)
E. W. Page, General Electric X-Ray Corporation
Dr Eugene P. Pendergrass, Department of Radiology, University of Pennsylvania
Dr George Pish, Airplane Division, Curtiss-Wright Corporation
Dr Scott W. Smith, The Kelley-Koett Manufacturing Company
George T. Taylor, Radium Chemical Company, Inc
Roger T. Waite, the Aetna Casualty and Surety Company
J. L. Weatherwax, Department of Public Health, Philadelphia General Hospital
Dr C. R. Williams, Liberty Mutual Insurance Company
Dr Francis C. Wood, Pathological Department, St. Luke's Hospital
D. F. Hayes, ASA Staff, served as secretary for the committee.

adjustment of the quartz crystals so vital to radio communication in time of both war and peace. By making use of a recently described technique, the resonent frequency of such crystals can be accurately adjusted by irradiation with x-rays. Crystals which had been over-ground and would ordinarily be discarded as not meeting specifications can be salvaged in this way.

As in the last war, x-rays are being used for detection of contraband.

The present ASME Boiler Code requires that seams and welds in boilers be examined by x-rays. It is required that a defect equivalent to 2 percent of the wall thickness be detectable by the x-ray technique used. There has not been a failure in a boiler inspected by the use of x-rays since this requirement was incorporated into the Boiler Code.

As used industrially, x-rays are produced by the use of power sources at voltages from approximately 10 thousand to several million. Radiographs are obtained of thicknesses ranging from a few thousandths of an inch to 12 inches or more in the case of armor plate. There are now many units in the United States rated at one million volts or more. The work which is being done at higher than 2 million volts is considered highly secret and not much detail is available to the public in regard to results being produced at voltages beyond 2 million.

Industrial X-Ray Hazard Comparable to Medical

The hazards encountered in the industrial application of x-rays are, of course, comparable to those experienced in the medical field and the precautions and methods of control necessary to safeguard the health of personnel are similar in nature. In the medical field, however, because of experience extending back over a period of approximately 40 years, there is a greater awareness of the hazards involved and a better understanding of the essential methods of protection.

It was therefore natural for the pioneers in the industrial field to fall back upon the experience of the physicists and radiologists experienced in the problems of medical x-ray protection. The need for such information became especially urgent when, as a result of the present war, many workers who had had no previous x-ray experience began using the radiation routinely without an adequate knowledge of the danger involved or the precautions to be taken.

Recognizing this potentially dangerous situation, the United States Department of Labor, Division of Labor Standards, through its Mr. R. P. Blake, discussed the problem with experts of the National Bureau of Standards. As a result of this discussion, the American Standards Association was asked by the Department of Labor, Division of Labor Standards, to form a war committee for the purpose of developing such a safety standard. It was the understanding that in the course of development of the American War Standard, data would be evolved which would later be used by a sectional committee on a national basis under the ASA peacetime procedure.

At the time of that request it was suggested that because the National Bureau of Standards had had wide experience in the matter of x-ray protection, the Bureau should act as sponsor when the standard should be developed on a permanent basis.

A survey by the American Standards Association confirmed the need for and widespread interest in this project.

In setting up the ASA War Committee, Z54, full advantage was taken of the experience acquired in developing protection recommendations for the medical field by requesting all available members of the American Advisory Committee on X-Ray and Radium Protection to become members of the new ASA committee.

It was felt that the safety of existing industrial x-ray installations should be checked at the earliest possible time; accordingly, it was decided at the first meeting of the committee that Part I of the proposed standard should give such information as is required to determine whether or not an x-ray installation is safe. The need for such information was so urgent that it was further decided to develop and publish this part before the remainder of the standard to make it available to industry at the earliest possible date.

The following is the subject matter of this part of the standard:

(1) Definition of the permissible daily dose
(2) Classification of x-ray installations
(3) Restrictions on the mode of operation of x-ray installations
(4) Methods of determining radiation hazards
(5) Methods of controlling personnel
(6) Health provisions
(7) Maintenance of records relating to x-ray exposure and health of personnel

The experience of the medical profession with penetrating radiation suggests that a person in good health can tolerate a daily exposure to x-rays or gamma rays amounting to approximately a tenth of a roentgen. To define the permissible daily dose more exactly is difficult because our present knowledge of the many factors bearing upon exposure to radiation is incomplete. There has been much discussion of this point and it is agreed that any level defined at the present time must be, to some extent, arbitrary. In 1937, the International X-Ray and Radium Protection Commission set the daily tolerance dose at 0.2 international roentgens.

The trend in both the medical and industrial fields has always been toward more and more penetrating radiation; as a result, the hazard to deep-lying organs in the human body is increasing progressively.

In view of this fact, the tolerance dose recommended in the National Bureau of Standards Handbook HB-20 was set at half this value; namely, at 0.1 roentgens per day. This value has now been accepted as the basis for x-ray protection for purposes of the American War Standard Safety Code for the Industrial Use of X-Rays.

Tolerance Dose Set at 0.1 Roentgens Per Day

In classifying industrial x-ray installations, the ASA committee has recognized that complete x-ray protection, although always desirable, cannot in all instances be built into an industrial x-ray installation without imposing serious limitations on the usefulness of the apparatus. Accordingly, installations having varying degrees of inherent x-ray protection were recognized and the limitations imposed on their mode of operation and on the supervision of personnel required for each was adjusted in proportion to the hazards involved. Thus, in a Class A installation, no restrictions are imposed on the mode of operation of the x-ray apparatus since such an installation is completely protected. In Class B or Class C installations, which afford comparatively less protection, restrictions are imposed on the mode of operation and the requirements with respect to supervision of personnel are much more exacting.

With reference to determination of radiation hazards, the war standard recommends that a qualified expert be consulted when plans are

made for a new installation or for changes in an existing installation. Before a new or altered installation is placed in operation a radiation survey by a qualified expert is required in order to detect whatever radiation hazards may exist in time to prevent injury to personnel. The need for properly trained personnel for these surveys is emphasized.

Film monitoring is recommended as a means of determining whether personnel are receiving radiation in excess of the permissible daily dose.

Radiation monitoring by means of ionization instruments is recommended in plants supervised by a qualified expert.

For installations subjected to unusual conditions of vibration or wear, periodic inspection of protective shields and interlocks is required.

The medical provisions of the standard require that the health program applying to x-ray workers be supervised by a licensed practitioner of medicine, the degree of medical supervision required being in proportion to the hazard involved in the operation of the several classes of industrial installations. Because the maintenance of health and exposure records are of importance in carrying out an adequate safety program and in affording legal protection to both the employer and employee, the standard requires that such records be kept on file for at least five years.

Other Parts to be Developed

In the near future the remaining parts of this safety standard will be published. The first of these will cover the uses of radium in industrial radiography. Another will cover the electrical hazards encountered in industrial x-ray installations. Because the very high voltages used in generating x-radiation may give rise to fire and shock hazards, adequate coverage of this aspect of the problem is essential. There has been a repeatedly expressed need for reliable and concise information on the methods and materials of x-ray protection to guide those drawing up plans for x-ray plants. One section of the standard now being developed will contain information and suggestions relating to protection design in x-ray installations in general; other sections will cover the detailed application of these methods and materials to various types of installations, covering the voltage range used in modern industrial x-rays up to 2 million volts.

REPORT ON THE POLIC

June 6, 1945

Mr. Gano Dunn,
Chairman of the Visiting Committee of the
National Bureau of Standards

DEAR MR. DUNN:

In behalf of the Policy Committee on Standards, herewith is submitted the report of that committee. The report is accompanied by Exhibit A and Exhibit B, Supporting Memorandum. Exhibit A is Carroll Wilson's report of December 3, 1943, revised as of September 15, 1944. Exhibit B is a short treatise on the present situation of standardization activities in this country as they now exist and the problem in connection with those activities as understood by this Committee.*

The report itself is confined to the problem assigned, and as such states its own case.

In arriving at the conclusions contained therein, a number of representatives from numerous branches of industry were consulted and in general, accord was reached.

These contacts and resultant discussions disclosed a number of factors which, while not of a nature to be included in the report, should be understood and considered. A review of some of these is given in this submittal letter.

From a study of the report, with its accompanying exhibits, it becomes apparent that no unified standards procedure exists and even after this situation is corrected by the standardizing bodies, a new procedure will require new techniques, broadened scopes and activities on the part of all. Cooperation between all must be accomplished.

Perhaps the greatest problem will be for ASA to accommodate its new burdens in an independent, single-purpose body, free of financial domination by any one interest, and its management reflecting adequately and equitably the interests and experience of producers, distributors and also the consuming public. This broadening of ASA interests in consumers goods will doubtless require an increase in the work of merchandisers and perhaps of educational institutions, in the top policy levels of its advisory council or board.

The ASA must arrange for more expeditiously clearing and approving standards through its Standards Council, broadened or streamlined through perhaps a board of judicially minded authorities.

When a desire for a standard has been established, the ASA should promote the development of consumers goods standards and must foster intelligent use thereof by the public, with the collaboration of educational bodies, through active participation in ASA.

Other questions which are apparently new and unanswered today are these:

What kinds of Consumer Standards are needed? Should they be the "minimum standard" or the "commercial standard" or both? In such standards is "par" the level to be reached or to be beaten?

Again, does this protection of the public require a more comprehensive formal acceptance for a standards adoption, or some form of laboratory testing standard and labeling?

These are some of the problems to be worked out, and to do so will probably require a continuing flexibility of procedure between all parts of industry affected by standards. Their solution will require experience and the thorough understanding of all. Time also will be required, and only through unified action can any plan succeed.

Respectfully submitted,

C. E. Wilson

Chairman, POLICY COMMITTEE ON STANDARDS.

* Exhibit A is not reprinted herein but may be had upon request.

COMMITTEE ON STANDARDS

CHARLES E. WILSON, Chairman

On January 12, 1945, the Secretary of Commerce of the United States, through the Visiting Committee of the National Bureau of Standards, invited representative leaders of industry to attend a "Conference on Standardization." The Industrial representatives attending this conference are listed in a box on page 146.

The conference was initiated because of the ever-increasing importance which it was felt industrial and consumer goods standards will have in our national economy and in recognition of the necessity for orderly procedure in their expanding development and for clarification of the relative roles which should be played by Government and industry in standardization activities in the postwar era.

The Secretary requested the conference to consider a report submitted to him December 3, 1943, revised September 15, 1944, by Carroll L. Wilson, Consultant to the Secretary of Commerce, entitled, *Standards in Commerce—A Basis for Action.*

A copy of this report (Exhibit A) may be had on request.

The conference endorsed the report and expressed the opinion that the top management of industry should give attention to the rapid growth of standards and provide for its orderly development.

The Conference also noted with approval the steps taken by the *American Standards Association* to broaden the scope of its work so that it may deal with any standards or standardization project whether in the field of engineering, consumer goods, or in any other field deserving national recognition.

The Conference recommended, however, that in the field of consumer goods, as in any other fields, each standard approved by the American Standards Association must represent the work of those groups which are affected by such a standard, and that no effort must be made to impose standards on them.

The Conference further recommended that the Secretary of Commerce appoint a Policy Committee of industrial executives to advise with Mr. Henry B. Bryans, President of the American Standards Association, in regard to these recommendations and the steps to be taken to effectuate them.

Accordingly, Wayne C. Taylor, Under Secretary of Commerce, appointed the following committee:

CHARLES E. WILSON, President, General Electric Company, Chairman
FREDERICK M. FEIKER, Dean of Engineering, George Washington University
CLARENCE FRANCIS, Chairman of the Board, General Foods Company
EPHRAIM FREEDMAN, R. H. Macy & Co., Inc.
FRANK B. JEWETT, President, National Academy of Science
WILLIAM B. WARNER, President, McCall Corporation
ARTHUR D. WHITESIDE, President, Dun & Bradstreet, Inc.
R. E. ZIMMERMAN, Vice President, U. S. Steel Corporation.

This Policy Committee reports herewith to the Secretary of Commerce, through the Visiting Committee, as follows:

The Committee believes that standards will have an ever-increasing importance. They will play an expanding role in the fields of engineering and manufactured goods to the commercial field and to many other new fields. Thus, they will ultimately affect the production and sale of all goods. With this belief, it becomes evident that provision must be made for the orderly development of all standards.

The Committee believes that standards activities which involve negotiation, opinion, judgment, or compromise, should be developed through individual and joint efforts of technical, manufacturing, merchandising and consumer groups.

The Committee also believes that these efforts will need to be coordinated and promoted through a disinterested private agency organized to function in the broad public interest. It appears that this function can most logically be fulfilled by the American Standards Association.

The Committee further believes: that the scope of the American Standards Association should be broadened so that it can handle any standards or standardization project which deserves national recognition, whether for raw materials, intermediate goods, production goods, consumer goods, or for safety or for engineering or for commercial transactions; that the American Standards Association should be modified and strengthened so that it can manage this suggested broad program effectively; that the Association must make sure it includes in its activities all groups entitled to a voice in the adoption of standards as well as those competent to advise on consumer reactions; and that the American Standards Association maintain itself as a truly independent association privately financed, accomplishing its standards clearance and standards promotion voluntarily, with the full participation of all interests including those of the consumer.

The Committee takes in good faith the assurances of the management of the American Standards Association that it will prepare itself to accept these and any other further steps that may be required in fulfilling the responsibilities of the nation's standards clearing house. Accordingly the Committee believes that the American Standards Association deserves sympathetic support of its aims, and the continuing, active cooperation in its work, of all interested agencies, both public and private.

The broadened policy of the American Standards Association; the recognition by industry that retail

Charles E. Wilson
President, General Electric Co.

customers are entitled to adequate information about the product they buy; the development both by the National Bureau of Standards and by private agencies of definite laboratory and service testing—all these will make it possible eventually to supply the desired information to consumers in standardized definitions, terms, designations, and specifications of consumers' standards. Such a result will strengthen and enhance merchandising techniques, and stimulate competition in product improvement.

Normally the standardizing functions of the Department of Commerce should center mainly in the National Bureau of Standards and any work in this field by other agencies or divisions of the Department should be complementary to and closely coordinated with the work of the National Bureau of Standards.

The true functions of the National Bureau of Standards in connection with standardization should be those of basic research, furnishing of facts, measurements, and technical assistance in the development of adequate testing methods. The National Bureau of Standards should freely lend its assistance to all responsible citizens and groups engaged in standards development. Whenever such cooperation involves public interest groups, as the American Standards Association (or certain of its member bodies), the Bureau's assistance may well be materially enhanced through personal membership and active participation by Bureau personnel, as individuals, in the work of these groups.

Edward N. Allen, President, National Retail Dry Goods Assn
S. Bruce Black, President, Liberty Mutual Insurance Co.
Frank Braucher, President, Periodical Publishers Assn of America
J. M. Brentlinger, representing the Vice President in charge of Research & Development, E. I. duPont de Nemours & Co, Inc.
Lyman J. Briggs, Director, National Bureau of Standards
H. W. Brightman, Executive Merchandising Director, Meier & Frank
Henry B. Bryans, President, American Standards Assn; Executive Vice President, Philadelphia Electric Co.
H. A. Bullis, President, General Mills, Inc.
A. C. Chameroy, Sears-Roebuck & Co., representing R. E. Wood, Chmn of Board
Willard Chevalier, Asst to the President, McGraw-Hill Publishing Co, Inc.
Clarence L. Collens, Chairman of the Board, The Reliance Electric & Engg Co.
H. M. Crane, Technical Asst, General Motors Co.
Gano Dunn, Chairman of Visiting Committee, President, the J. G. White Engg Co.
Wallace Falvey, Executive Vice President, Massachusetts Bonding & Insurance Co.
Frederick M. Feiker, Dean, School of Engineering, Geo. Washington University
Clarence Francis, Chairman of the Board, General Foods Corp.
Ephraim Freedman, R. H. Macy & Co, representing Jack I. Straus, President
Tom M. Girdler, Chmn of Bd, Republic Steel Corp, Cons. Vultee Aircraft Corp.
C. F. Hansen, Director of Research and Planning, W. T. Grant Co.
Frank B. Jewett, President, National Academy of Sciences
Charles B. Jolliffe, Chief Engr Radio Corp of America
Virgil Jordon, President, National Industrial Conference Board, Inc.
K. T. Keller, President, Chrysler Corp.
Jules Labarthe, Jr., Sr Industrial Fellow, Mellon Institute of Industrial Research, University of Pennsylvania
G. M. Lebhar, Editor, Chain Store Age
G. C. MacDonald, Director of Bureau of Standards, Montgomery Ward & Co.
D. N. Mauger, Executive Asst, The Babcock & Wilcox Co.
H. M. McCormack, Asst General Mgr of Sales, American Can Co.
E. V. Murphree, Vice President, Standard Oil Development Co.
Arthur E. Pew, Jr., Vice President, Sun Oil Co.
C. F. Rassweiler, Vice President, Research & Development, Johns-Manville Corp.
Stanley B. Resor, President, J. Walter Thompson Co.
A. W. Robertson, Chairman of the Board, Westinghouse Electric Corp.
Clyde L. Rogers, National Industrial Conference Board
Warner Seely, Secy The Warner & Swasey Co, representing Charles Stilwell, Pres.
N. A. Shepard, Chemical Director, American Cyanamid Co.
E. O. Shreve, Vice President (Sales), General Electric Co. representing Eric A. Johnston, President, U. S. Chamber of Commerce
Earle Smith, Chief Metallurgist, Republic Steel Corp.
George H. Taber, Jr., President, Sinclair Refining Co.
Wayne C. Taylor, Under Secretary of Commerce
John M. Van Horson, Young & Rubicam Co.
William B. Warner, President, McCall Corp.
Ralph J. Watkins, Representing A. D. Whiteside, President, Dun & Bradstreet, Inc.
John W. Watzek, Jr., Crossett, Watzek & Gates
Oliver G. Willits, Vice Pres, Campbell Soup Co, Representing A. C. Dorrance, Pres.
Charles E. Wilson, President, General Electric Co.
Carroll L. Wilson, National Patent Planning Commission
H. F. White, Representing Robert West, President, Esmond Mills
R. E. Zimmerman, Vice President & Member of Executive Committee, U. S. Steel Corp.

The Committee recommends that the National Bureau of Standards plan for a continuation of research in the field of standards, and for future development of needed new testing methods and that this be properly financed through Federal funds. The Bureau's facilities should be extended when and as necessary so that the Bureau may most effectively aid standardization projects.

The Committee recommends that the Division of Simplified Practices and the Division of Trade Standards, now a budgetary part of the National Bureau of Standards, be transferred from the Bureau of Standards to a more suitable status elsewhere in the Department of Commerce. The work of these groups should continue, but on the levels of research and technical consultation. Their research should include: studies of the economics that might result for consumers from performance and operational standards; the determination of consumers' reactions to performance standards used in merchandising; surveys to determine the need for standards in consumer and commercial fields. Assistance should be freely given to groups seeking help in formulating standards, but the department should be free of responsibility for the results.

Under this new functional assignment, the National Bureau of Standards would be equipped to furnish physical data for standards, while the Department would be prepared to supplement such material with economic and marketing information. In both these phases of standards work the facilities of the National Bureau of Standards (or the Department) would be directed to basic research for facts needed by any responsible groups engaged in formulating standards or desiring to initiate standards. (Among such groups would be included the cooperating groups of American Standards Association.) Furthermore, Bureau and Departmental personnel would be charged with giving technical counsel, and would be encouraged to participate directly in standardizing activities of various public interest bodies. The Department would abstain from promoting new standards on its own initiative and would avoid any attempt itself to compete as a national clearing house.

These recommendations are based on two assumptions:

First—that interested private groups are best qualified to initiate

and formulate voluntary standards;

Second—that the American Standards Association can and will in due time develop adequate capacity, "know-how", and status for performing the necessary functions of nationwide clearance and promotional leadership, and

In conclusion, the Committee believes that the approach recommended—calling for a functional division of effort between the Department (including the National Bureau of Standards) and interested private groups (including the American Standards Association) and for active cooperation among all parties concerned—offers great promise as a means of guiding the progressive adaptation of standards to the needs of the nation's commerce during the decades immediately ahead.

CHARLES E. WILSON, *Chairman*

Henry A. Wallace
Secretary of Commerce

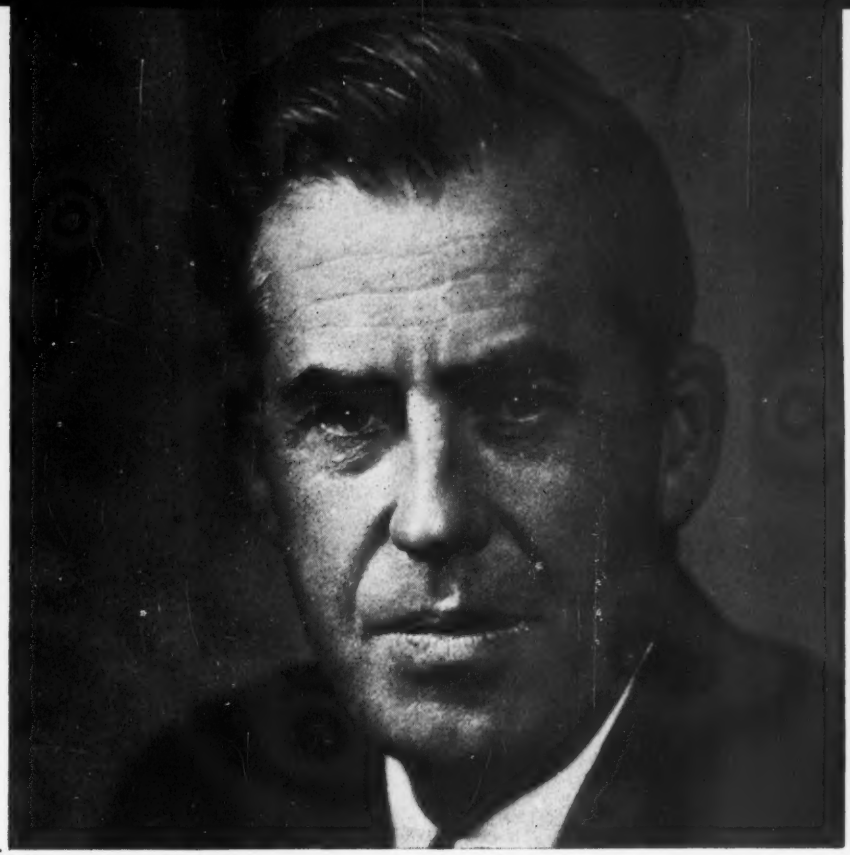


Exhibit B: SUPPORTING MEMORANDUM

It is a fact, not generally recognized, that standards constitute one of the most important subjects of mutual interest to business and government, and that standards are becoming a subject of equally important interest in the relations between industry, distributors and the public.

It was, therefore, natural that the first resolution adopted by the Conference of Fifty Industrial Executives, which met on January 12, 1945, at the University Club in New York, at the request of the Secretary of Commerce, should read:

> "That, in the opinion of the Conference, the rapid growth of standards activities, their extension into new fields, and the bearing of standards upon production and sale all make it important for top management to give attention to this matter and to provide for its orderly development."

Standards, both product standards and standard methods of test, are referred to in Government purchase invitations, in Trade Practice Rules promulgated by the Federal Trade Commission, in regulations issued by the Food and Drug Administration, in safety orders of the Bureau of Mines, in many health or safety laws or ordinances of states and municipalities, and in regulations and orders issued thereunder, and by many other governmental agencies, Federal, State and local.

In many forms of regulations, due to lack of clearly stated terms having a meaning prevalently accepted in the trade, the enforcing agency is compelled to adopt his own version of the intent of regulations and give published broadcast of such meaning. Often such terms are capable of numerous interpretations and in some cases contradictions are serious in results and contrary to intent.

Will a piece of meat pass inspection under the health laws? Providing an answer requires the use of a standard by the Government agency responsible for inspection. Is a package of merchandise falsely labeled? Is an advertisement true or false? Is a business custom a fair or unfair trade practice? There can be no answer to such questions without the use of a standard—formal or informal, adequate or inadequate.

Including Federal, State and municipal agencies, there are literally hundreds of administrative agencies which must use standards, develop them, often from the ground up—too often without the constructive cooperation of business. Thousands of such standards have been formulated by governmental administrative agencies and written into regulations with which the affected industry and trade and its customers must comply.

Provided an industry or trade has developed standards in written, clearly understandable and usable form, nearly all agencies, private or governmental, naturally adopt and use standards developed by industry, which are already accepted by, and known to the public.

As an illustration of this fact, some seventy codes, each approved as "American Standards" are now in use through legislative acts of states as the backbone of regulations for the protection of workmen, each of them developed cooperatively, by all parties of interest and under industrial sponsorship and the guidance of the American Standards Association.

Similarly, standards for the prevention of industrial diseases, fire prevention standards developed by the National Fire Protection Association, the Boiler Code, developed by the American Society of Mechanical Engineers, and the standard methods of test developed by the American Society for Testing Materials, and many others, are "American Standards" and are used in regulatory activities of many states and municipalities, and referred to in various Federal, State and municipal regulations, including building codes.

Inasmuch as the development of standards for food and drugs is assigned by Federal Statute to the Food and Drug Administration and

the Department of Agriculture, and since the development of specifications and standards for purchases by Federal Government departments is assigned by Statute to the Federal Specifications Board, standards developed for food and drugs and specifications for Federal purchases have never been presented to American Standards Association for approval as American Standards.

Similarly, standards play a rapidly increasing role in private business transactions, being used in purchase specifications for materials or equipment to be used in industrial processes or in commercial operations, or being used by distributors, especially retailers, in the purchase of merchandise for resale to their ultimate consumer customers. To an increasing extent, not yet widespread, the consuming public is becoming aware of the meaning of standards for consumer goods — especially aware of labels or other forms of certification that a product meets some standard.

Postwar Outlook

World War II, like World War I, has given a great impetus to standardization. During and immediately after World War I, all major industrial nations, except Great Britain which already had one, found it necessary to establish national standardizing bodies. There are unmistakable signs that similar acceleration and intensification is now occurring and that it is likely to continue at an even greater pace during the period of reconversion and readjustment and thereafter.

The many changes that have been caused by conversion of industry to war production that will be caused by reconversion to peacetime production have created a need for many new standards and for changes in existing standards in order to fit them to new conditions, if they are adequately to meet and help solve difficulties in production or in commercial transactions—if parts are to fit, if defects in workmanship or materials are to be avoided, if delivery dates are to be met, if misunderstandings between manufacturer and purchaser are to be eliminated and if purchasers are to be adequately assisted in selecting and obtaining without delay the proper product for particular needs.

The fields in which standardization is most highly developed are those relating to production equipment, materials or processes, together with those relating to protection against fire, accident and other hazards, both involving engineering standards.

The resultant advantages are well known; the economics of mass production and distribution, better control of product quality, broadening of sources of supply and expansion of markets, lessening of customer complaints.

But the standardization movement is spreading to other product fields —notably into the field of consumer goods—both "soft" goods, like textiles, and "hard" goods, such as household equipment.

The right of the retailer and the right of his customer to adequate information regarding the products they buy should be and is now widely recognized by industrial executives. Retail customers continue to press for information regarding the performance characteristics and serviceability of merchandise. Laboratory and service testing is becoming more general, together with more objective methods of test. This trend leads to use of standard definitions, standard terms for describing products, and other standards for consumer goods. Thus used, these constitute a somewhat new and increasingly important merchandising process or technique, and stimulate competition in improvement of products, their performance or serviceability.

In view of these significant trends, it is important that there shall be adequate organization and other provisions for the development of all types of standards which deserve national recognition. Beside the national technical and professional societies and the trade associations which are active in the field of originating or initiating the development of standards, there are two organizations, each of which occupy positions of unique importance, namely, the National Bureau of Standards and the American Standards Association.

At present, in most respects, each performs functions quite different from those performed by the other. To a limited extent, they perform similar functions, thus competing with each other or duplicating each other's work.

It is quite desirable that duplication of function should be removed and that the work of each should be strengthened, with much gain from the points of view of both Government and business.

National Bureau of Standards

The National Bureau of Standards has been, is, and was intended to be a great scientific institution—a great research laboratory in the field of measurement. It is the official custodian of the standards of measurement of the United States of America. It is this nation's prime agency in the field of the science of measurement, in the field of research and method of test, research in the field of physical and chemical constants, all of which are so essential to the development of technical industries.

In these respects, the National Bureau of Standards is truly unique and truly a great scientific research institution.

The Division of Trade Standards of the NBS assists industrial and other interested groups in the development of commercial standards. Likewise the Division of Simplified Practice of the Bureau assists industry in the elimination of unnecessary types, sizes, and varieties of manufactured products.

While a number of standards from each Division have become American Standards through the nation's clearing house, it is apparent that there is here a duplication of work.

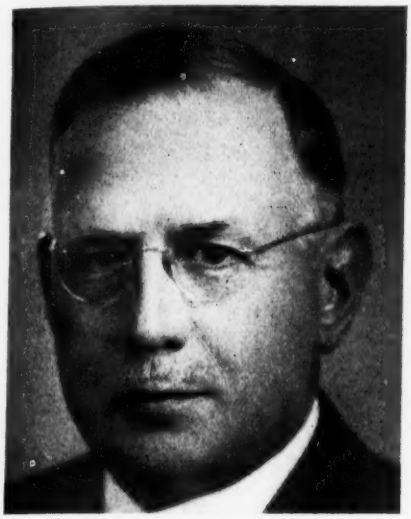
American Standards Association

The ASA was organized to serve as the national clearing house for standards. At the present time it is a federation of twenty-one professional and technical organizations, fifty-five trade associations, seven departments and three other agencies of the Federal Government. It works on the principle that each "American Standard" must represent a consensus of the groups concerned with it. Depending on the standard under consideration, these include producer, consumer and general interest. Over eight hundred standards have been approved, of which approximately 30% originated with the American Society for Testing Materials. Over five hundred national organizations have been cooperating in its activities and over three thousand men and women are serving on its committees. Over fifty Federal Bureaus are cooperating in the work of the ASA. Most of its work is carried out through balanced all-party-at-interest committees, each of which, somewhat similar to a legislature, is made up of representatives appointed by the organizations interested in the particular subject under consideration.

The public interest requires more effective standardization facilities than have so far been provided by either or both semi-private agencies and Government.

Strengthening the Bureau of Standards

One of the chief bottlenecks in the development of national standards is the lack of adequate test methods for determining the characteristics of products. This is especially true in the case of consumer goods. The development of methods of test requires a great deal of physical and chemical research.



Gano Dunn
Chairman of Visiting Committee

The NBS has been a chief source of basic research on methods of test and other types of scientific data needed in standardization activities. While its work has been invaluable and deeply appreciated, the Bureau's work in this field needs to be broadened and strengthened, and its resources for this type of work need to be increased.

The Field for American Standards Association

For that class of standardization activity which requires knowledge of customer requirements, manufacturing process, trade terms, and, therefore involves judgment and opinion and which involves progressive change, the best job can and should be done by semi-private agencies.

The ASA should continue as the clearing house for national standards, limiting its activities exclusively to clearing house and promotional functions. The Association should not be the initiating source for standards formation; for physical research; testing or laboratory work as such. The member and cooperating bodies should be those through whom all such work must be initiated and performed.

Although the initiation of standards is not a function of ASA, any interested group may propose that a standard should be developed and can sponsor a proposed standard or seek a sponsor. If, after investigation, the ASA finds that there is sufficient support for the development of the standard, a properly balanced, all-party-at-interest committee can be appointed and the project carried to conclusion. In some cases a conference, supplemented by correspondence, may suffice. Provision is also made for submission to ASA of existing standards for approval as "American Standards."

If, however, there is lack of adequate support for the project or the industry or trade concerned actively opposes the development of a standard for which consumers or distributors recognize a need, a preliminary or temporary standard may be prepared, with the benefit of basic research data obtainable from any source, including that of any Department of Commerce Divisions or its agencies established to furnish such data.

With a national clearing of standards activities functionally, the American Standards Association can readily and definitely improve these added consumer goods activities.

Realizing the broadened scope that would thus lie before the Association, and realizing that the Association has not in the past lived up to these broadened activities, the Committee is glad to be informed by Mr. Henry B. Bryans, President of the ASA, that through its Board and its Standards Council, active work has been and is being done to meet the needs of the postwar period and particularly to permit it to function most effectively in all standards fields including that of consumer goods.

Mr. Bryans advises further that:

Activity of ASA in the field of Consumer Goods is under the supervision of the Advisory Committee on Ultimate Consumer Goods and sometimes jointly with some other Committee. An amendment to the Constitution of ASA designed to remove any doubt as to whether ASA may serve in the field of consumer goods has been confirmed by ASA Member-Bodies and approved on May 24, 1945;

The ASA is making an intensive study of means of improving its organization and methods in order best to serve the mutual interests of business and the consuming public in the field of standards for consumer goods;

Interlocked with these problems is that of securing a broadening of the membership by enlisting both more associations as Member-Bodies and companies. To all these the Board of Directors of ASA is giving careful study.

While carrying on these studies, the Association is endeavoring to maintain and to improve upon the methods and traditions developed during its twenty-six years of experience;

In particular, it maintains the principle that all groups substantially concerned with a standard have an inherent right to a part in its development; and that no standards will be approved; without a clearly demonstrated consensus of the interested groups.

It likewise conducts its affairs so that there will be universal confidence in its integrity and so that every group, irrespective of size or influence, can have confidence that it will have opportunity for "its day in court";

It has attained and maintained itself in a position to deal adequately with the international aspects of any standards undertaking;

It also maintains a comprehensive and up-to-date library and information service; and publishes a monthly magazine covering broadly and thoroughly the field of standards.

Conclusion

A digest of this supporting memorandum clearly demonstrates to this Committee that it is to the forward-looking self-interest of business that its executives should make adequate provision for the handling of standardization problems, first, within their own companies, and second, within their trade associations, and thirdly, within the professional and technical societies. It is equally to their interest that they should, through their companies, and trade associations, adequately support, both with effort and funds, not only the standardization work of the national, professional, technical and trade associations in which they have or should have a part, but also, through affiliation, activity and the supply of adequate finances, support the work of the federation of these bodies—the American Standards Association.

Work Shoes in Brazil

By Milton F. Pereira

WORK accidents in Brazil present far greater problems than most people realize. Only those who know the industrial situation well can appreciate the size and difficulty of the task of accident control in my country.

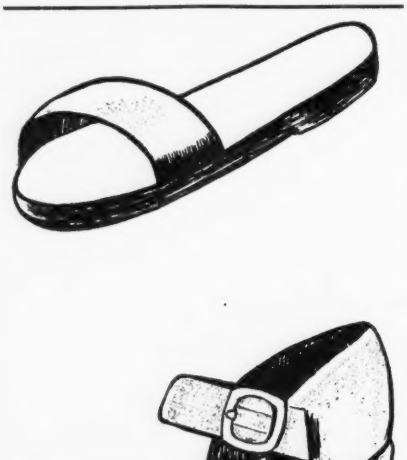
Shoes and the Brazilian workers' foot injuries are excellent examples of the obstacles we must overcome in Brazil in order to develop a practical safety program. In the six months that I have been in the United States I have not yet seen any person in the street without shoes. The Brazilian worker does not wear shoes, or if he does he almost always wears a type of shoe known as a "tamanco." The tamanco itself is the cause of many accidents. The Division of Hygiene and Safety of the National Depart ment of Labor of Brazil opposes the tamanco as a work shoe and the Mayor of Rio de Janeiro prohibits its use by bicyclists because of the alarming increase in accidents by persons wearing tamancos.

The tamanco is not really a shoe but an extremely simple sandal, a piece of wood roughly resembling a footprint, held on the foot by a single strap of leather or cloth (see illustration). To take a step the wearer must press his big toe up against the strap, raising the shoes. The back of the wooden sole flops loosely as he walks —the same as wooden shower or beach sandals.

This so-called shoe is an adaptation of the "socos," the Portuguese version of the boot, with a wooden sole used by the Greeks in their comedies. Carried to Brazil by the conquistadors, the boot succumbed to the heat of the tropics and was reduced to the wooden sole with the narrow strap. In all fairness it must be said for the tamanco that it is cool, cheap, and durable. As a work shoe such advantages are overshadowed by the accidents and fatigue that beset the wearers of these ficticious shoes.

The fatigue factor is important. The inflexibility of the wooden sole together with the insecure fastenings make walking difficult. To keep the tamanco on the foot, the big toe must be cramped against the wooden sole and the arch of the foot must press against the narrow strap. The muscles of the foot and leg are contracted abnormally in order to keep the tamanco on the foot.

The tamanco is responsible for the high frequency of foot injuries. According to our accident records, most of the injuries are due to falls, or to the foot being struck by fallen objects such as bricks, stones, or tools; to nails, splinters, wires, and to contact with steel, wood, or stones as found on construction jobs.



The direct and indirect costs of these injuries are high for the worker and the employer. Injuries to the feet are usually slow to heal because feet are seldom clean and complications often develop requiring anti-tetanus serum. Medical costs alone are often much higher for foot injuries than for injuries of equal severity to other parts of the body. In almost any case of a foot accident the worker is immobilized, losing time from his work and slowing down production. These should be sufficient reasons for management actively to oppose the use of the tamanco as a work shoe and to promote the use of a shoe better adapted to the hazards of modern industry. To say the least, there would be fewer accidents, lower insurance rates, and less absenteeism.

Changing the Brazilian worker's shoe habits is no simple matter. He does not like ordinary leather shoes because they are expensive, hot, and uncomfortable. He calls it "Chinese suffering" when he wears them. Ordering or even persuading him to wear the excellent safety shoes such as you have developed in the United States is out of the question. I do think it is possible to effect a change, however, by gradually and methodically modifying the tamanco, adapting it to work conditions while retaining the virtues of coolness, cheapness, durability — and familiarity. The result would not be a genuine safety shoe but it would be a great advance in safety protection over the tamanco.

I believe that a "tamanco of tomorrow" could have a steel cap covering the toes and forefoot, the cap perforated for ventilation. This would afford some protection from falling objects or striking against objects. There would be a heel of leather with a strap fastening the shoe securely to the foot and eliminating the dangerous flop and much of the fatigue. The wooden sole would be retained but made more flexible in a manner similar to that already developed in the United States for practical "hinged" wooden soles (see illustration).

This new tamanco would still be a sandal but it would combine a certain amount of protection with the best features of the traditional tamanco. At least it would be an acceptable beginning for further experimentation and adaptation. Even the simplest improvement would increase the Brazilian worker's safety and efficiency.

Safety engineers in the United States, plagued by injuries to workers who have failed or refused to use safety clothing, will be interested in this discussion of a serious safety problem of Brazilian industry. Dr. Pereira, chief of the Accident Prevention Section, Division of Hygiene and Accidents, National Department of Labor of Brazil, has been in the United States for six months on a fellowship awarded by the Division of Labor Standards, U. S. Department of Labor. While here he has studied and observed methods of accident control, safety education, inspection, and enforcement. This study brought him to the American Standards Association for a visit during which he expressed intense interest in the American War Standards for safety shoes.

Can Industrial Color Finishes Be Effectively Standardized?

By D. L. Hadley and C. B. Ryder

How two large companies analyzed the use of color for industrial equipment and arrived at conclusions concerning four standard grays to achieve—more pleasing appearance, better visibility, and elimination of difficulty in matching colors when replacing parts or repainting equipment.

THE principal problem confronting industry today is production; but there are, nevertheless, other important, although subsidiary problems facing both industry and the Armed Forces. One of these is color.

Most people think of naval operations as confined to problems involving the amount of fire power and punch that can be delivered by a vessel against the enemy. However, the men who use complicated control apparatus are also concerned with a visual factor.

There are hundreds of instruments in the control rooms of all types of ships, that have to be read, understood, and acted upon almost instantaneously. Lighting and color conditions can either facilitate or hamper; "visual acuity," or speed of seeing, is critical, and eye fatigue may be crucial. Such things as these can determine the ultimate outcome of a naval engagement.

Attention was focused on this subject when suppliers and manufacturers of naval switchgear, including the Westinghouse Electric Corporation and the General Electric Company, were requested to survey and make recommendations on improved standards for switchgear in lighting, color, and appearance.

Brought together on this common ground, a comparison of data was made. This disclosed that parallel investigations were underway directed toward the development of company standards for color and finish as a major part of a plan for the functional improvement of the product.

The similarity of the problems and methods of solution in the two companies seemed to indicate that the problem must be of interest to other manufacturers of industrial equipment and to their users, also. Because of this similarity, it is possible in this article to present the combined views of two investigators.

Perhaps postwar standardizing holds the possibility not only of better and more economical products, but of products that, whatever their sources, would look well or harmonize when assembled together by a manufacturer or his customers.

The Situation

Innumerable times manufacturers of apparatus develop and use new paints of unusual shades in an attempt to satisfy various desires. No guiding rules have been recognized in industry, except possibly the use of "machine tool gray," standardized by the National Machine Tool Builders Association. As a result, hundreds of grays alone are in use, many of which can be considered as "bad matches" with each other.

Industry, however, is becoming conscious of the need for better appearances. There is increased demand for two-tone combinations that require proper contrast. Lack of economy, therefore, is noted in the all too frequent need for refinishing equipment that is assembled together, to obtain uniformity in appearance. The matching of finishes in part replacement or maintenance painting is a difficult problem.

Also, industry is becoming conscious of the psychological effects of color in industry and its importance in respect to health, safety, and performance. These reasons also account for present interest in color.

Since gray is the first concern, the initial activity mentioned herein is restricted to that subject.

Grays have long been the usual finish for industrial products. Perhaps the selection of gray was first made on the basis of its impartial sobriety, considered fitting to the old idea of work. In any event, industry today is parent to thousands of different grays,—the variations consisting of minor differences of value or hue in many cases, but still different.

(The terms hue, value, and chroma refer to terms appearing in the American War Standard Specification and Description of Color, Z44-1942. The three-dimensional Munsell system is comprehensive and well adapted as a working standard for industrial use. It possesses the advantages of decimal notation suit-

When making an investigation for the Navy for improved color standards for naval switchgear, the Westinghouse Electric Corporation and the General Electric Company discovered that their surveys were proceeding along parallel lines, and that both were working toward company standards for color and finish, with much the same results.

Because color is assuming more and more importance in industry as a factor in efficient production, and other companies may be faced with similar problems, the engineers in charge of the survey in the two companies here present their findings and the conclusions they have reached.

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able to the use of instruments. The spectrophotometer is the only instrument, known to date, capable of reading color in terms of scientific constants uncompromised by weaknesses of the eye or lighting. Refer to Figure 1 for definitions of Munsell terms.)

Together with the decision to attempt order in this field of grays came recognition of the need to define the field. The term "gray" has been much too loosely used, applying to anything between black and white with little color. It may be defined as purely neutral combinations of black and white, devoid of any color. But for industrial uses this definition is found to be very inadequate; it leaves out the vast majority of border-line grays that are neither neutral nor definite in hue. Actually, there are as many such families of so-called gray as there are hues in the spectrum. A survey in one of the companies showed that only 3 percent of the paints called gray were within the above definition.

There are other disadvantages to adopting the definition of grays as purely neutrals, although it first seemed that the problem would be greatly simplified if this could be done.

In carrying out the investigations, five spaced neutral grays, from dark to light, N 2., N 3., N 4.5, N 6., N 7.5 were selected, and these Munsell notations specified for matching by five paint suppliers; the best results showed an average percent of visible error of 77. This is largely due to the technical difficulties in formulating pure neutrals. The so-called pure black and white pigments when mixed produce grays having the appearance of intermediate hues of slight degree. They cannot be considered neutral. The tendency is toward a bluish or purplish cast. To correct this, small amounts of color pigments must be added.

Furthermore, the average person finds little satisfaction in the drab, colorless neutrals. As cited above, a strong tendency to the use of more definite color industrially is to be expected, and even in the field of grays this tendency can be turned to advantage in popular preference.

For these reasons it was deemed advisable to discard the definition of grays as neutrals and seek a broader one adapted to practice and manufacturing limitations. Extensive surveys within the two companies showed that approximately 84 percent of their "grays" had a chroma, or color content, of 1.5 or less under the Munsell System of notation. (See Fig. 1) Each company therefore has adopted the tentative working definition of grays as applying to "neutral shades" or "hues" not exceeding 1.5 in chroma. Thus a distinct line is drawn between our present field of endeavor and "black," "white," or "color." The industrial use of color is in no way retarded; instead, such a standard for grays will make its foundation secure.

Analysis

With grays defined, the next step was to determine the optimum number of grays needed for general-purpose industrial requirements. At this point the field narrowed to consideration of external finishes only. Apart from the wish to minimize the number for reasons of economy, it is obvious that the more shades admitted the closer will be the approach to "bad matches." The fewer grays there are on standard stock products the more practical it will be to plan definite and acceptable contrasts. For, in the last analysis, there is little likelihood of controlling the number or source of stock products that might come together under one roof.

In an analysis of past usage, both companies noticed that approximately four shades or "values" of gray between, but not including, black and white would meet general-purpose requirements. The lighter grays were found to be preferred on smaller equipment, and progressively darker shades for larger and heavier apparatus.

Next it was found that the color content, or "hue" of a gray may vary all the way from yellow to purple-blue. Cool blue and purple-blue predominate, particularly in the darker shades. But the results of the general tendency toward brighter colors was evident even here. In the past few years a swing toward warmer, or yellow grays, has gained so much ground that it cannot be ignored. This is more true of the lighter finishes commonly used on indoor equipment. Use of the darker finishes persists on outdoor equipment where blue-black pigments offer high durability.

Therefore, the existence of two basic hue families, yellow and purple-blue, had to be recognized. These hues are in maximum color contrast, and, it is well known, yield green when mixed. However, the same "values" or shades of these two families are very bad companions. A light yellow gray and a light purple-blue form an inharmonious combination. The same is true of the dark yellow gray and the dark purple-blue and, to a lesser extent, of any other two intermediates of the same value. This is the common occurence that so disturbs, not merely appearance designers, but anyone else, when apparatus from many different sources, with no standardization of color, are viewed together in the final installation.

Fortunately, the difficulty vanishes when value contrast is added to hue contrast. In other words, when combining a yellow-gray and a purple-blue-gray, a light value of one and a dark value of the other should always be used. An intermediate hue such as a green-gray has sufficient of both yellow and blue to harmonize with either in a variety of shades. Such combinations are not only satisfactory, but pleasing.

The chart, Figure 2, graphically

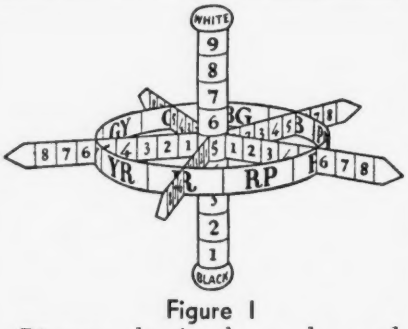

Figure 1

Diagram showing hue, value, and chroma in their relation to one another. The circular band represents the hues in their proper sequence. The upright center axis is the scale of value. The paths pointing outward from the center show the steps of chroma increasing in strength as indicated by the numerals.

HUE: The distinctive primary characteristic of any chromatic color. In terms of hue we describe a color as red, yellow, green, blue, or purple.

VALUE: The lightness or darkness of any color. In terms of value we describe all colors as dark, middle, or light.

CHROMA: The strength or weakness of a chromatic color. In terms of chroma, color is described as weak, moderate, or strong.

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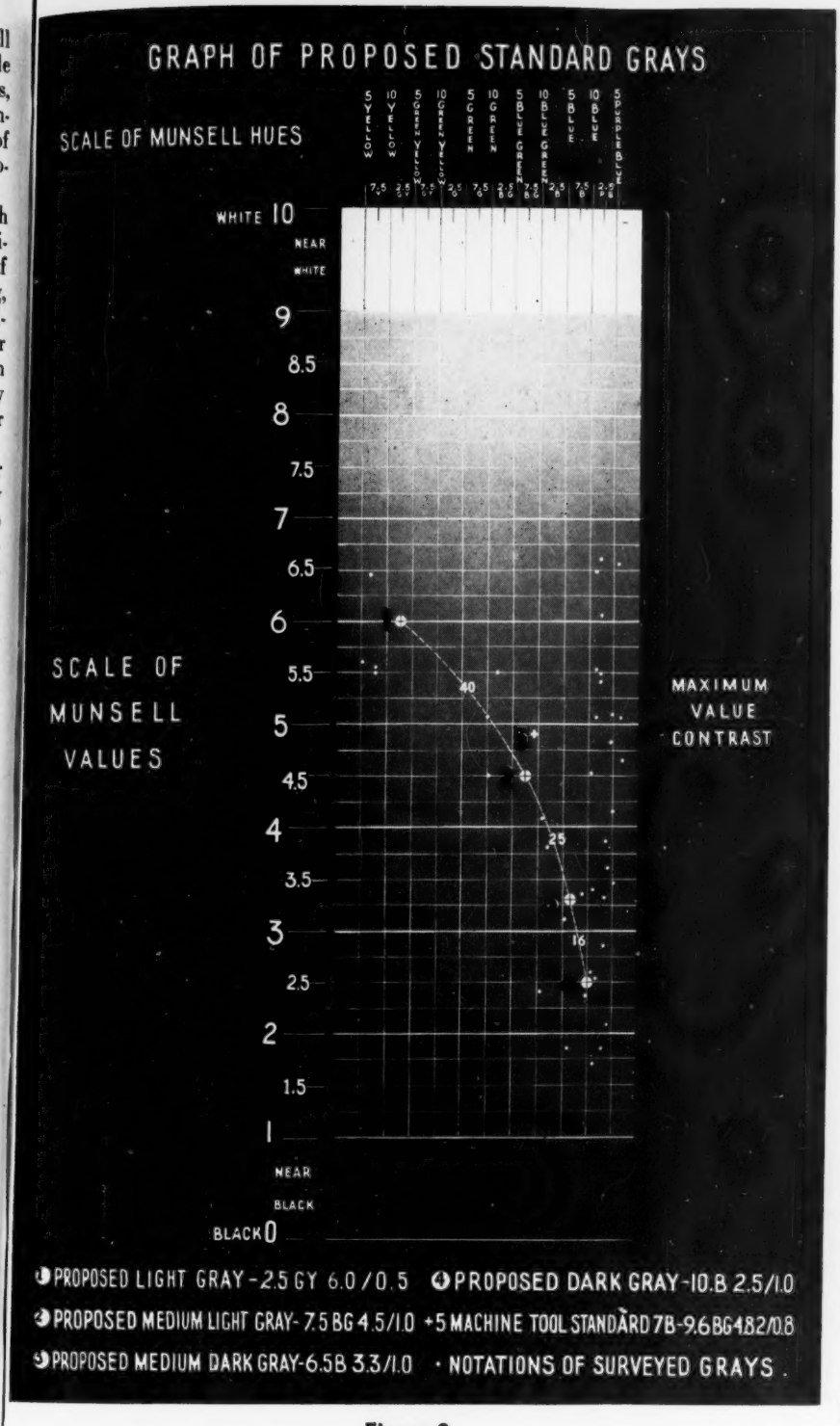


Figure 2

shows how the four grays were finally selected. The vertical scale at the side is in terms of the Munsell value, from light to dark reading down. The horizontal scale across the top reads in terms of Munsell hue, from yellow at the left to blue at the right. The hue and value units were proportioned to agree with the least perceptible difference that the eye can detect; so that a true circle drawn about a notation point can describe a permissible tolerance, horizontally in hue, vertically in value. The dot indicates notation in hue and value, the circle describes tolerances further discussed below.

Upon this graph the positions of the two extreme grays are indicated by the points marked 1 and 4. After many trials judged by many experts, all directed toward the selection of two intermediates that would form a progression pleasing to the eye in contrast and harmony, the grays indicated at points 2 and 3 were selected. When placed upon this graph it becomes evident that their selection was no arbitrary choice. A curve drawn through the four points indicates a logical progression. The disposition of the points so closely agrees with a preferred-number progression (See American Standard Preferred Numbers, Z17.1-1936), that they can scarcely be shifted to any advantage. Other dots upon this graph indicate the notations of 40 sample grays used in the greatest bulk by one of the two companies. Here again it is worthy of note that the selected four are so located as to favor the majority, and yet their coverage of extremes is evident from the manner in which the curve cuts across the field.

Thus four grays were selected. The lightest of these has a warmth; enough yellow in it to be properly called a "french" gray. It is very close to an average of the majority of light grays now used on indoor apparatus, such as switchgear, and is already almost a standard by common consent for such uses. The darkest gray is cool, of the typical purple-blue type and dark enough to meet all requirements of formulation for extreme durability. This also is a common consent standard for heavy outdoor apparatus such as transformers. The next to lightest gray has more yellow than blue; may be termed a blue-green gray. This gray was found to be close to the new Machine Tool standard gray. The last, or darker, intermediate gray is cool, approaching the blue family. It alone of the four is at all new to industry, being a little lighter and more blue than the old Machine Tool gray, but its selection was the result of the effort to develop systematic spacing of all, in both hue and value.

Common adoption of four such grays would result in good color harmony when all or more than one occur together either on separate products or as two-tone treatments of a single product. It would also establish a group of grays including and consequently harmonizing with the hues proposed for the major areas in industrial plants by the exponents of "color engineering."

Numerous samples of the grays that were selected were made and subjected to Spectrophotometer analysis. The results were averaged and yielded the Munsell-Spectro-

photometer notations given under "Conclusions."

How Tolerances Were Determined

Since a finish of this kind must have some flexibility to be workable, tolerances had to be established. It is easier to "pin the tail on a donkey" than to formulate a paint that conforms exactly to a specified notation. The process of trial and error is still used. Consequently, a reasonable amount of error should be permissible; but its degree should be limited. Studies on this phase of the subject showed that there are certain small differences that, while sufficient to be detected when samples are placed directly together, are not noticeable to the average person as soon as such samples are separated. Such differences, based on visual thresholds, would seem to be a reasonable basis for determining tolerances. They may be reduced to the approximate values given under "Conclusion."

While these may appear small, it must be recalled that errors seldom exist in one dimension alone, but are usually compounded. The effect upon the eye is cumulative and the maximum tolerated error in all three dimensions will be much more noticeable than in one.

There is much work yet to be done by industry in this matter of determining tolerances. Even if tentative tolerances are acceptable from the standpoint of visual matching it is still quite uncertain as to whether they could be held in practice. The differences resulting from formulation in different materials and vehicles, for different methods of application, and subjected to differing methods of analysis may very well add up to much greater totals, and that excludes the effects of aging of material upon the samples matched, as well as on the product finished. It is also possible that greater tolerances may be acceptable and necessary on the darker grays than are allowed on the lighter ones.

The degree of gloss of the finish is also a factor that may affect the appearance or match. However, the situation with regard to instruments for measurement of this characteristic of a surface is now so unsettled that it was decided unwise to attempt definition or standardization of the terms "flat," "semi-gloss," and "gloss." This situation is one seriously deserving attention, but, until settled, tolerances must be sufficient to cover variations due to gloss differences.

Conclusion

The following summarizes gray specifications that are being considered by the designers of the two companies for their respective products:—

Scope—

To apply to the use of grays in finishing external parts of industrial products, machines, and apparatus where grays are normally used.

Definition—

The term "gray" should apply to all neutral shades or hues not exceeding a Munsell chroma of 1.5; the term "color" should apply to anything of a higher chroma.

Notation—

Recommended grays are identified by four Munsell notations:

Light gray	2.5GY6.0/.5
Medium light gray	7.5BG4.5/1.0[1]
Medium dark gray	6.5B3.3/1.0
Dark gray	10B2.5/1.0

Tolerances—

Matching of standard grays, as above, should be limited as closely as practical to the following:

Hue, plus or minus 1.0
Value, plus or minus 0.5
Chroma, plus or minus 0.5

Method—

The determination, and analysis and identification of such recommended grays should be according to the Munsell-Spectrophotometer system as specified in American War Standard Specification and Description of Color, Z44-1942.

Use of these grays appears to be logical. The lightest gray has been accepted as part of the recommendation on switchgear made to the Navy. As rapidly as laboratory work on formulation of the materials can be accomplished, they will be applied and tested under all conditions of practical production, application, and durability.

It is believed that standardization of grays is desirable on industrial equipment and would go far toward reducing the confusion now existing. The parallel endeavors of the two companies may indicate that national standardization is practical.

[1] The new National Machine Tool Gray Standard, 7B which has been measured as 9.6BG4.82/0.8 is close enough so that its use would be a reasonable alternate.

ASA Company Member Forum to be Re-established

Before the war, standards engineers of Company Members of the American Standards Association found it helpful and stimulating in solving their company standardization problems to meet for the exchange of ideas and experiences. The medium through which these informal discussions took place was known as the ASA Company Member Forum. During the war, however, these meetings were, of necessity, abandoned.

In answer to the many inquiries received at ASA headquarters, the first step toward re-establishing the Forum has been taken, with the appointment of Willis S. MacLeod, Consultant to the Director of the Procurement Division, of the Treasury Department, as chairman of a committee to study this matter and present suitable recommendations to the ASA. The committee is considering the desirability of formally organizing the Forum as a committee within the framework of the ASA. If found desirable, definite proposals will be made in regard to the scope of the program, methods of carrying on the work, and the objectives to be attained. The committee held its first meeting on June 7 and formulated tentative ideas which it will again discuss in a meeting scheduled for September 6. Members of the committee are:

W. A. Bischoff, Bell Telephone Laboratories, Inc
F. A. Compton, Detroit Edison Company
H. A. Gillan, Eastman Kodak Company
H. W. Robb, General Electric Company
Thomas Spooner, Westinghouse Electric Corporation
William Staniar, E. I. Du Pont de Nemours & Company
Henry Lamb of the ASA staff is serving as secretary of the committee.

The Company Member Forum was originally organized in 1938 and held regular meetings throughout 1939, 1940, and 1941. It was conducted on an informal basis and no detailed records were kept of the meetings. Subjects discussed included the relation of a company standards department to other departments; preferred numbers; screw threads; and classification and identification of metals and alloys.

International Uniformity

Theme of British-Canadian-American September Screw Thread Conference

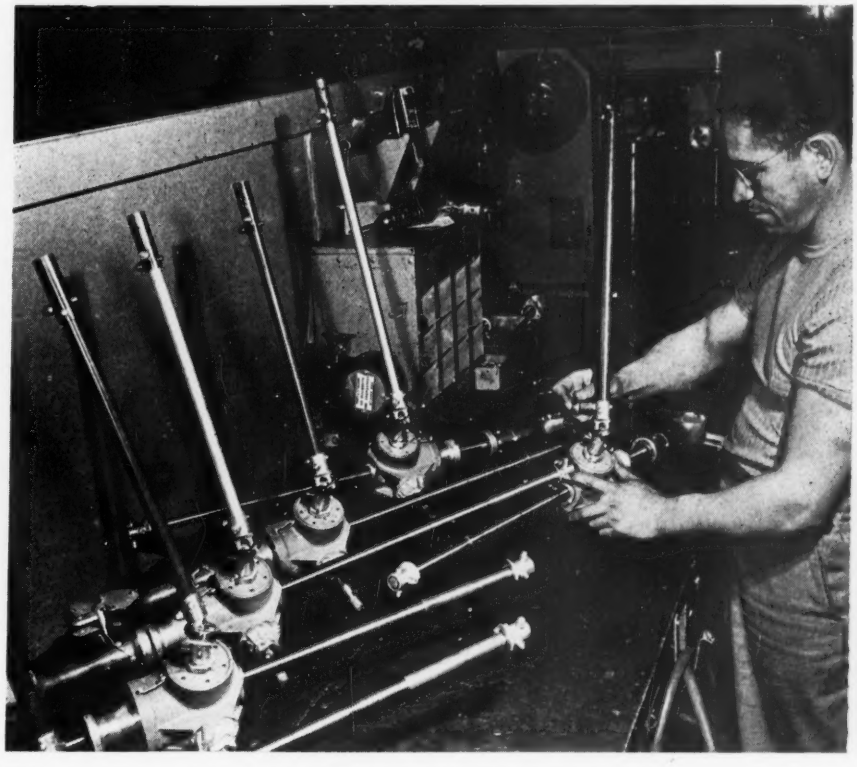
War committees of the American Standards Association draft technical recommendations for consideration at international conference in Canada this Fall

INTERNATIONAL cooperation will take another forward step when representatives of industry in Great Britain, the United States, and Canada meet in Ottawa this fall to consider proposals for standard dimensions and specifications for screw threads used in war and peacetime equipment. The meeting, under the auspices of the Combined Production and Resources Board, is the third in a series which has already brought agreement on an American War Standard for Acme threads, used in a wide variety of machine tools, control mechanisms for aircraft, and ordnance.

Since the last meeting between representatives of the three countries in London last fall (see INDUSTRIAL STANDARDIZATION, December, 1944 and April 1945), war committees of the American Standards Association have been working on proposed standards, several of which are now being put into final form for consideration at the Canadian conference. They were discussed at a series of meetings from June 20 through 22, at which the ASA War Subcommittees discussed the technical material already prepared and made recommendations to the general ASA War Committee on Screw Threads for proposals to be considered at the conference in Canada. As a result, proposals on stub Acme threads, truncated Whitworth threads (revision), instrument threads, high-duty studs in light alloys, buttress threads, and pipe threads, are now being put into shape for presentation at the Canadian conference.

At the June meetings reports were also received on the work done toward the unification of American and British valve outlet threads for compressed gas cylinders; the establishment of a standard screw thread nomenclature; and a long-range research program undertaken in the three countries for the purpose of arriving at a permanent solution of the unification of American and British coarse, fine, and special threads.

The status of the several projects as reported at the June 22 meeting of the General ASA War Committee on Screw Threads is as follows:



This man is assembling the actuating screw mechanism of the B-17 bomb bay. The Acme screw used in the assembly is 7/8 in. x 8 double lead.

Acme Threads, B1.5—

The American War Standard on Acme Threads, B1.5-1945, completed early this year, has been adopted by the Canadian Standards Association as a Canadian standard, and is now being considered by the British for adoption as a British Standard.

In addition, a proposed American War Standard for Stub Acme Threads, which have a shallower depth of thread than the regular Acme threads and are used mainly where the regular thread would occupy too much space, has now been drafted, and sent to the British and Canadians for their consideration. An amended edition will be submitted for consideration at the Canadian conference, which is expected to take place at Ottawa, Canada, late in September of this year.

Buttress Threads, B.10—

Up to the present time there has been no generally adopted standard for buttress threads in any of the

three countries. Buttress threads are used for taking up high stresses in the direction of the thread axis, such as occur, for example, in the breach mechanisms of large guns and in airplane propeller hubs. A draft specification prepared by the British was considered by the ASA War Subcommittee at a meeting June 21. Tentatively, a pressure angle of 7 degrees and a back angle of 45 degrees were agreed on, together with depth of engagement of 0.4 pitch. A somewhat amended draft is being prepared for further discussion during the conference in Canada.

High-Duty Studs in Light Alloys, B1.8—

This subject is of particular interest to the aircraft engine industry where steel bolts are inserted into aluminum and magnesium castings and forgings with fits requiring different interferences depending on the hardness of the metal. American and British industry follow different practices, the Americans using coarse threads for the "metal" end of the stud, while the British use fine threads. A tentative proposal for a series of oversize limits for the pitch diameter of studs in sizes from ¼ in. to ⅝in. (progressing by 1/16 in.) has been prepared, with corresponding tolerance zones for the pitch diameter of the tapped hole. The latter zones extend from basic to plus and the intention is that for each kind of hardness of the casting or forging, a pitch diameter tolerance for the tapped hole will be chosen somewhere in the standard tolerance zone. This proposal will be discussed further before the conference in Canada.

Instrument Threads, B1.7—

This work was started primarily to cover fastening screws for aircraft instruments and has since been widened to include optical instrument threads as well. The subcommittee has drafted a tentative proposal for threads for fastening screws for instruments in sizes up to 0.060 in., which will be ready for discussion at the Ottawa meetings, together with a proposal expected from the British.

A newly organized subgroup on optical instrument threads met in New York June 21 to discuss threads for optical tubes and cells, and threads for mounting instruments on stands. A proposed thread for microscope objectives and photomicrographic lenses which has the truncated Whitworth thread form and is interchangeable with the Royal Microscopical Society thread was discussed. This proposal, developed by the Spencer Lens Company, was referred for further development to two members of the subgroup representing the Spencer Lens Company and the Bausch & Lomb Optical Company. Tentative recommendations for a series of pitches to be used for lens tubes and cells, and a series of pitches for fine motion screws were also formulated and will be considered further by the subgroup.

For mounting instruments on stands, such as tripod threads for cameras, surveying instruments, etc., it was tentatively decided that the 3½ inch—8 pitch thread for the base-plate nut and tripod-head screw developed in 1927 by the National Bureau of Standards should be recommended as an American War Standard. Tripod threads now in use by the Engineers Corps of the U. S. Army range from 1¾ inch to 4½ inch diameter. If manufacturers find difficulty in working to the tolerances specified for the National Bureau of Standards thread, however, the decision may be reconsidered. A draft is being prepared for consideration at the Canadian conference.

Pipe Threads, B1.11—

In an effort to bridge the differences that now exist between American and British pipe threads of the same nominal size, it was agreed at the 1944 London Conference that the Americans should draft a series of pipe threads for diameters 4 inches and below, that could be used interchangeably with either American or British Standard pipe threads. This has now been done and the recommended threads have been tested by being assembled with both American and British fittings. This proposed compromise thread has been tentatively designated as an "international" pipe thread and will be submitted to the British and Canadians for discussion at the Canadian conference.

Screw Threads for Compressed Gas Cylinders, B1.12—

Interchangeability between the valve outlet threads of gas cylinders of American and British origin is a matter of great importance in field service. Without such interchangeability it is impossible, for example, for the American armed forces to use the contents of British gas cylinders, also, or to refill them. This problem has been handled on the American side by a technical committee of the Compressed Gas Manufacturers Association which has been working on a proposal including not only the threaded connections, but also other details of the cylinder valves in order to secure a maximum degree of interchangeability. This proposal will be taken up with the British and Canadians at the Ottawa Conference.

Screw Threads of Truncated Whitworth Form, B1.6—

In order that the British and American standard specifications for truncated Whitworth threads may agree in every detail, a proposed revision of the American War Stand-

Chairman of the general ASA War Committee on Screw Threads is Elmer J. Bryant, Greenfield Tap & Die Corporation. Chairmen of the war subcommittees are:

Acme Threads—Paul J. DesJardins, Pratt & Whitney Division, Niles-Bement-Pond Company

Truncated Whitworth Threads—Colonel H. B. Hambleton, Army Ordnance Dept.

High-Duty Studs in Light Alloys—F. E. Richardson, Army Air Forces

Instrument Threads—F. E. Richardson

Screw Thread Unification (War Emergency Solution)—Paul J. Des Jardins

Buttress Threads—H. W. Bearce, National Bureau of Standards

Pipe Threads—A. M. Houser, Crane Company

Screw Threads for Compressed Gas Cylinders—Colonel H. B. Hambleton

Screw Thread Nomenclature—(War Subcommittee now being organized, H. W. Bearce, Chairman)

ard, Screw Threads of Truncated Whitworth Form, B1.6-1945, will be presented for discussion at the Canadian conference. The truncated thread was developed when American industry found it difficult to produce the British Standard Whitworth rounded screw threads required for British war materiel.

Screw Thread Nomenclature—

Specifications for the different screw threads on which British, Canadian, and American committees are working call for a large number of symbols designating various dimensions of the threads. For a common understanding of the specifications it is important that these symbols be the same in all three countries. At the London conference in 1944 it was agreed that the Americans and the British would each prepare a list of screw thread symbols with their corresponding definitions. These lists have been prepared in the United States at the National Bureau of Standards and in Great Britain, at the National Physical Laboratory. Both lists were discussed at the meeting of the general ASA War Committee on June 22 where it was decided that they should be given further consideration before the Canadian conference.

Screw Thread Unification, B1.9—

A proposal for a unified American-British fine thread series, based on the American Standard fine threads, the roots of which have been rounded, was presented by the American mission at the 1944 conference in London. The British gave the proposal a favorable reception as an emergency solution pending the working out of a permanent solution which is to be based on a research program now being undertaken in the three countries. They suggested that the proposal on fine threads be amplified by a similar proposal for coarse threads and threads with special diameters and pitches. As a result, a complete proposal including coarse, fine, and special threads has been prepared in the U. S. This draft was discussed in a meeting of the War Subcommittee on Screw Thread Unification, June 20 and will be presented for further discussion at the Canadian conference.

Research Program on Optimum Thread Form—

The proposed unification of American and British screw threads (see Screw Thread Unification, B1.9, above) is intended to provide a compromise thread acceptable to the American and British industries at the earliest possible date. While this will offer a solution to the emergency problem, the Americans, British, and Canadians are at the same time considering a long-range plan for establishing a unified system of coarse, fine, and special threads. This will involve common agreement on the angle of the thread, which is now 60 degrees in the American system and 55 degrees in the British. At the conference in London, 1944, a comprehensive research program was agreed upon to determine whether the American or British Standard form of thread is techincally better or whether there may be no significant difference between the two systems. As part of this program a series of tests will be carried out in the three countries, with identical testing machines and identical samples of parts threaded to the American and British standards. These tests are being carried out by the National Bureau of Standards (U. S.), the National Physical Laboratory (Great Britain), and the National Research Council (Canada). It is expected that the status of this research work will be discussed at the Canadian conference.

Transition to Peacetime Standardization—

It is expected that most of the American War Standards developed under the procedure of the general ASA War Committee on Screw Threads will ultimately become regular American Standards. Therefore, the American Society of Mechanical Engineers and the Society of Automotive Engineers, sponsors for the peacetime ASA project on Screw Threads, invited several members of the peacetime subcommittees to attend their meetings on June 20-22 as guests of the ASA War Subcommittees.

Townsend Elected ASTM President

J. R. Townsend, materials engineer, of the Bell Telephone Laboratories, Inc and newly elected president of the American Society for Testing Materials, has been appointed a member of the ASA Mechanical Standards Committee for the term of two years ending December 31, 1946, as representative of the ASTM. He succeeds H. H. Morgan of the R. W. Hunt Company, Chicago. R. E. Hess, assistant secretary of the ASTM, continues as alternate representative. Mr. Townsend is also one of the representatives of the ASTM on the Standards Council of ASA.

J. R. Townsend

Mr. Townsend was elected president of the ASTM on June 27. T. A. Boyd, head of the Fuel Department, Research Laboratories Division, General Motors Corporation, was elected vice-president. Members of the Executive Committee are: J. R. Freeman, Jr., technical manager of the American Brass Company; L. J. Markwardt, assistant director of the U. S. Forest Products Laboratory; C. H. Rose, chemist for the National Lead Company, Research Laboratories; and W. A. Zinzow, chief physicist for Bakelite Corporation.

For many years Mr. Townsend served on the following sectional committees of the ASA: Screw Threads and Screw Thread Gaging, B1; Allowances and Tolerances for Cylindrical Parts and Limit Gages, B4; Small Tools and Machine Tool Elements, B5; Nut, Screw, Bolt and Rivet Proportions, B18; and Wire and Sheet Metal Gages, B32.

Mr. Townsend, completing a term as ASTM vice-president, has been extremely active in many fields of work of the Society.

Resistance-Welding Standards Recognize War Production Use

By G. W. Garman

WITH its inherent advantages of speed of operation, low cost, and its adaptability to many metal-fabricating jobs, the use of resistance welding has continued to increase and has played an important part in our war program. The shortage of manpower, too, has increased the importance of this process as a high degree of operator's skill is not required.

Resistance welding, which includes spot, seam, projection, and flash welding, is used in the fabrication and assembly of a wide variety of products in practically every industry. Its principal use is in the joining of most metals and alloys in the form of sheets, wire, and rods. Its versatility is such that it can be used in the joining of the fine wires in electronic tubes or the fabrication of the sheathing on railway cars.

With the increased demand for resistance-welding machines, controls, and electrodes there has developed a definite need for standardization of types, sizes, and ratings to make the most effective use of the limited production facilities available. Such standardization is expected to reduce manufacturing and engineering time by eliminating much of the off-standard equipment, believed necessary in the past.

In addition, there are many fabricators who are using this method of metal fabrication for the first time and who are not familiar with equipment ratings, types, and terminology. Standards including up-to-date definitions, therefore, should be of assistance to these users in their selection of the correct equipment.

Because of the large increase in the use of resistance welding, the War Production Board, early in 1943, requested the American Standards Association to organize a war committee for the preparation of standards for resistance welding equipment. The basis for the standards was the work done by a task committee of an Industry Advisory Committee of the WPB. The actual work of preparing the standards was by a committee of welding specialists thoroughly familiar with the design, application, and use of the equipment involved.

The American War Standard Specifications for Resistance Welding Machines covers definitions, general requirements for machines, detailed requirements on the various types of welders, and methods and conditions of tests.

G. W. Garman, General Electric Company, is chairman of the subcommittees on specifications for resistance welding machines and on controls.

Definitions used in the past were reviewed and, where necessary, revised according to present-day practice. Where a new definition was required, such a definition was prepared. There are 57 definitions which apply to both the machines and the process.

The section "General Requirements" covers service conditions, rating, temperature limitations, insulation, and name and rating plates. This section includes a useful table on "Equivalent Ratings" which lists the allowable kva demand for different percent duty cycle.

The section "Detailed Requirements" lists complete information on the standard types of horn-type spot welders, press-type spot and projection welders, seam welders, upset-butt welders, flash-butt welders, and stored-energy welders. Such information as size, transformer rating, transformer cooling medium, horn spacing, size and taper of electrode holders, transformer primary voltage rating, nominal throat depth, and nominal electrode force are tabulated for each of the standard types and ratings.

Methods and Conditions of Test

The last section "Methods and Conditions of Test," includes information on methods of determining input and output of the welding transformer, and operating temperatures. A dielectric test for resistance welding transformers is also included.

The American War Standard Controls for Resistance Welding Machines includes 23 definitions. Some of these are new in the welding field and include definitions of synchronous timing, non-synchronous

The personnel of the War Committee on Resistance Welding, C52, under whose supervision these standards were developed, is as follows:

C. A. Adams, E. G. Budd Manufacturing Company
M. M. Brandon, Underwriters' Laboratories, Inc
L. W. Clark, Detroit Edison Company
S. A. Greenburg, American Welding Society
G. W. Garman, General Electric Company
C. J. Holslag, Electric Arc, Inc
S. M. Humphrey, Taylor-Winfield Corporation
Colonel G. F. Jenks, North American Aviation
T. R. Lawson, Westinghouse Electric Corporation
George Sieger, S. M. S. Corporation
R. Taylor, Electroloy Corporation

Liaison Members

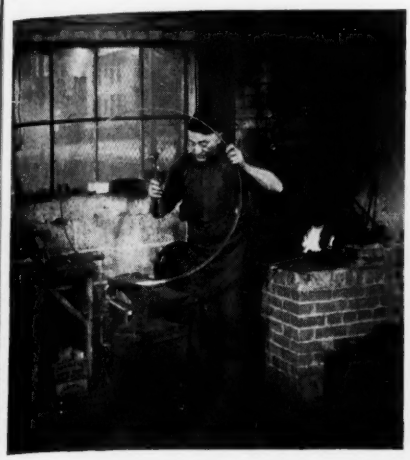
E. J. Fox, Canadian Wartime Prices and Trade Board
P. M. Hall, War Production Board

Cyril Ainsworth, Assistant Secretary of the American Standards Association, was chairman of this committee.

The following American War Standards for Resistance Welding Equipment are available from American Standards Association:

Straight and Offset Resistance Welding Electrode and Electrode Holders, C52.3-1945	30¢
Controls for Resistance Welding Machines, C52.4-1945	25¢
Specification for Resistance Welding Machines, C52.5-1945	40¢

timing, electronic contactor, and electronic heat control. With the large increase in the use of electronic



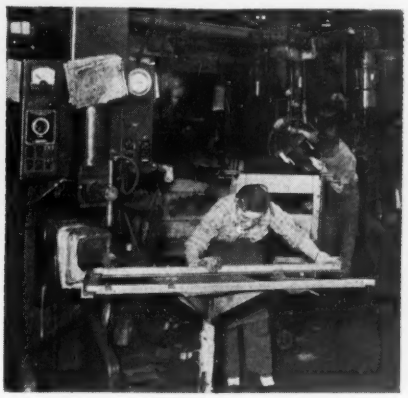
Above.—Electric resistance welding now takes the place of much of the work formerly done by the village blacksmith.

Right.—Resistance-welding machines in an electrical manufacturing plant.

control equipment, these definitions become of considerable importance. While this standard includes standard types of sequence and sequence-weld timers only, which are non-synchronous, it is expected that the standardization of synchronous timers will follow, in a peace-time standard. There is also included as part of the non-synchronous timer standards a welding cycle chart which explains in a simple manner the difference between the various time intervals and the corresponding timer settings. This inherent difference is sometimes confusing and this chart should help to explain it.

The American War Standard for Straight and Offset Resistance-Welding Electrodes and Electrode Holders has reduced to 13 the 60-odd types formerly in use, thus conserving limited production facilities. Detailed dimensions are given.

The adoption and use of these standards should prove to be of



value to both users and manufacturers alike. It is also expected that they will form a valuable basis for the preparation of peacetime standards.

Because of the lack of standards in this field in the past, the ASA peacetime committee, Electric Welding Apparatus, C52, is starting work immediately to study the new American War Standards for possible use or adaptation as peacetime standards. The committee is under the sponsorship of the American Welding Society.

Fouilhoux Dies in Fall

Member of ASA Building Code Correlating Committee

J. Andre Fouilhoux, prominent American architect and member of the ASA Building Code Correlating Committee for ten years, was killed June 20 in a fall from the roof of a building he was inspecting at Waverly and Lafayette Avenues, Brooklyn, N. Y.

Mr. Fouilhoux was elected a member of the BCCC on July 7, 1935 and served on this committee as a representative of the American Institute of Architects until the time of his death.

Mr. Fouilhoux was born in Paris and was educated in France. After coming to this country in 1904, he went to Portland, Oregon, and formed in 1908 the architectural firm of Whitehouse & Fouilhoux. During World War I he served as an officer in the 129th Field Artillery, U. S. Army, and was discharged with the rank of major.

During the following 25 years, Mr. Fouilhoux headed architectural firms in partnership with the late Raymond M. Hood and more recently W. K. Harrison at 45 Rockefeller Plaza, New York City. Mr. Fouilhoux was one of the designers of Rockefeller Center and the Theme Center—the Trylon and Perisphere—at the New York World's Fair. Among other well known structures which Mr. Fouilhoux designed or helped to design were the McGraw-Hill Building at 330 West 42nd Street, New York City, the Daily News Building at 220 East 42nd Street, New York City, and the Chicago Tribune Building, in Chicago.

Safety Drive Planned for Fabricated Steel Industry

Gratifying results having been obtained as a result of its campaigns for safety in the slaughtering and meat packing, the paper and pulp, and the planing mill and wooden container industries, the National Committee for the Conservation of Manpower in War Industries is starting a new safety drive in the fabricated structural steel industry. This industry is one of major importance in war and peace and its accident record indicates an urgent need for safety work, V. A. Zimmer, director of the Division of Labor Standards, declares.

So successful have been previous campaigns for safety that in one industry, Mr. Zimmer reports, there was a 36 percent reduction in an industry's national accident experience.

Representatives of the fabricated structural steel industry and a few other selected agencies that may help in developing advisory control measures met June 29 to outline the program to be followed. As in the three previous campaigns the American Standards Association is acting as one of the cooperating agencies.

The ASA has been working cooperatively with the Committee by furnishing such technical information for the accident prevention program as may be obtained in American safety standards.

Standard Production Key to Prosperity

The full benefits of modern production methods can be achieved only by standardized production, a procedure which requires substantial markets, declared Dr. J. L. B. Cooper, addressing the British Association of Scientific Workers recently.

Two steps are necessary to create markets, he said. First, a high standard of living in England and the colonies to absorb production, and second, concentration on single, high-quality models of products which can be produced most efficiently by mass production.

Film Spools
The Gremlin

Nonstandard dimensions for film spools caused many headaches for aerial photographers—light leaks, film breakage, overlapping of photographs. Work of Subcommittee 1, Sectional Committee Z38, has standardized dimensions, removed headaches.

THE expensive military job of taking pictures from the air requires both small- and enormous-sized aerial cameras, precision-machined to prevent errors from creeping into precious film negatives. While each section of an aerial camera, from shutter to film magazine, always has been given minute attention in manufacture, an accessory "weak link" caused trouble in the aerial photographic field for years.

This weak link was the mongrel-sized spools for aerial roll film. These film spools had a chaotic variety of shapes and sizes that changed overnight seemingly just to create confusion among users. Costing perhaps only a few cents to make, they were nevertheless known to cause photographic errors that ran into thousands of dollars.

In the early days of aerial photography, film spools were made of wood, connected by screws to outer metal flanges. When the wood became damp, the spools would swell, causing aerial film rolls to puff out considerably beyond the normal circumference of the spool. Later, wood was discarded entirely, and aluminum substituted. This was a decided improvement, but still the problem of disunity in dimensions of the spools' flanges, opening slots, spool thread sections, etc., when used in varied types of cameras with their varied-sized rolls of film, continued.

Frequent complaints from the field where commercial photo-mapping missions were under way, emphasized the fact that this "afterthought," the film spool, with its dimension variances, was causing light leaks, film breakage, overlapping photographs, and all the other annoyances that can make the lot of an aerial photographer an unhappy one.

The war, pushing into use many new types and sizes of aerial cameras, with their range of requirements for several sizes of aerial roll film, made the solution of discrepancies in film spools essential.

Actually, though, this problem was long considered and worked on by responsible companies and persons allied with aerial photography. It came to a definite conclusion through the joint work of Subcommittee 1, Sectional Committee on Standardization in the Field of Photography, Z38, of the American Standards Association, under the sponsorship of the Optical Society of America. The scope of this committee is "the formation of definitions, dimensional standards, and recommended practices in the field of photography, and the establishment of methods for testing, rating, and classifying the performance characteristic of materials and devices used in photography, including its industrial applications, but excluding cinematography."

On March 3, 1945, final approval was given the American Standard Dimensions of Aerial Film Spools, Z38.1.32-1945 through Z38.1.40-1945. There are eight specific standards in all, covering an equal number of classifications in aerial cameras.

The eight standard film spool sizes are:

(1) ASA Z38-1-P-1 (5¼ in. x 2 ⅛ in.) for K-20, K-25, and F-48 Fairchild cameras.

(2) ASA Z38-1-P-2 (5½ in. x 2⅝ in.) for K-24 Eastman and F-24 Williamson (British) cameras.

(3) ASA Z38-1-P-3 (7 in. x 1 13/16 in.) for K-21 Folmer-Graflex and K-15A Fairchild cameras.

(4) ASA Z38-1-P-4 (7 in. x 2⅜ in.) for K-10, K-15, F-8, F-11, K-16, K-15A, F-1, F-14, F-25, and F-56 Fairchild cameras.

(5) ASA Z38-1-P-5 (7 in. x 4⅝ in.) for F-56 Fairchild camera.

(6) ASA Z38-1-P-6 (9½ in. x 4 in.) for K-1, K-3, K-3A, K-3B, K-3C, K-7C, K-8, K-8AB, K-17, K-17B, K-18, K-19, K-19A, K-19B, K-22, K-23, F-4, and T-5 Fairchild cameras.

(7) ASA Z38-1-P-7 (9½ in. x 5 3/16 in.) for K-3B, K-17, K-17B, K-18, K-19, K-19A, K-19B, K-22, K-23, and T-5 Fairchild cameras.

(8) ASA Z38-1-P-8 (9½ in. x 6⅝ in.) for K-3B, K-17, K-17B, K-18, K-19, K-19A, K-19B, K-22, K-23, and F-51 Fairchild cameras.

The cameras mentioned more than once accommodate several types of magazines and therefore require more than one size of aerial roll film.

The important work of Subcommittee 1, composed of personnel from eight companies connected with aerial photography, and with the cooperation of the U.S. Army and Navy, has helped to contribute to the fine record of aerial photography in World

Spool Dimensions of Aerial Photography

By Peter Zaremba [1]

War II. Army and Navy photographers are not beset with photographic failures in their dangerous missions of flying over enemy territory, taking photographs that decide and form our military strategy. The film spool is certainly a small and incidental part of an aerial camera's over-all accessories, but the gremlin-like harm it once did is no longer possible under present standardization.

In 1937, for example, when an aerial surveying company was photomapping the Republican River watershed in the midwest for the Soil Conservation Service of the Department of Agriculture, an oversized film spool almost made it necessary to refly hundreds of miles to take new pictures.

Using a Fairchild F-4 aerial camera, with an A-1A film magazine, the photographers mapped 4,000 square miles, working out of a base at North Platte, Nebraska, and using 20 rolls of aerial film. The flying weather was so fine that the job continued fast and unabated. But when the inevitable rains set in, the photographers began to develop the pictures they had taken. It was only then they made the horrifying discovery that the last 15 negatives on each roll of film overlapped one another from one-quarter to one-half inch. This damage would affect at least one-third of the mission.

Upon investigation, it was found the film spool used in the camera was the culprit. Yet this spool was claimed to be exactly the same type as that used before in the same camera. The slots in the end flanges of the spool were too large for their pivots, however, giving the film too much play at the end of the big roll. When the camera was wound to pull the film through, the roll remained stationary temporarily, and, instead of winding properly, the wind cycle would move the slack in the film rather than a new section of it. Overlapping pictures were the result.

Fortunately, in this one case, the overlap in the pictures taken was remedied with great pains in the map-compilation room. But this serves to indicate the harm and expense film spools are capable of creating.

So, since it is "the little things that count," film spools were given long study by the group of experts composing ASA Sectional Committee Z38's Subcommittee 1. Among the many points solved were:

(1) Light leaks on the film are now reduced. Before, with varying sized film spools, light seeped into the crevices between the edge of the film and the flanges, fogging the end sections. In some film rolls, as much as 1/16 inch space prevailed between the film and the end flange. But sometimes this same space was so limited that the film would catch tightly on the edge of the flange, and tear in its travels around the spool. Now with standardization, the dimensions are held uniformly, neither too large nor too small, and all spools are held to those dimensions.

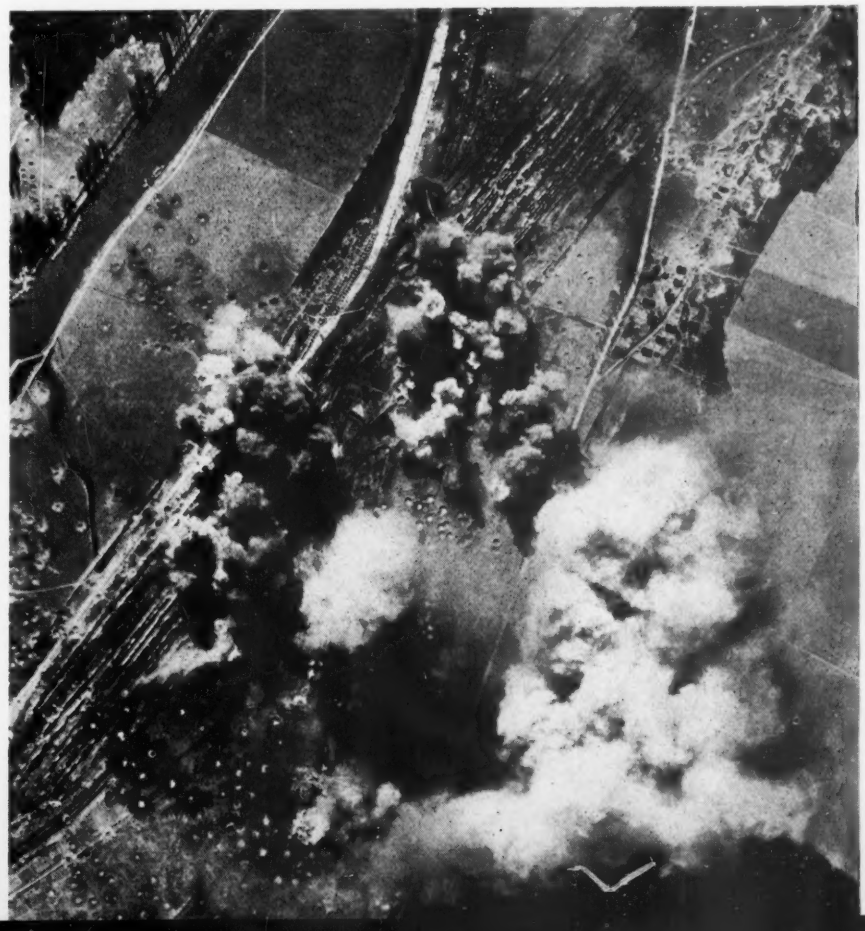
(2) Aerial roll film spools no longer rub against the top magazine cover because of varying diameter sizes of the flange. Each film magazine is built to take a certain type of film spool, perhaps 3 inches in diameter. Formerly film spool manufacturers might, for some reason, suddenly replace their 3-inch spool with a spool of 3-1/16 inch diameter—an almost imperceptible difference, but one that immediately caused field troubles in film rips, shearing of adjusting pins, etc. Diameter sizes of the flanges are now standard.

(3) Pivot slots in the flanges are now uniform, so the spool can work back and forth easily. Before, varying slot sizes produced slack in the film through uneven measuring and metering. Sometimes, if the slot were too small, the spool was unable to fit into the magazine at all. Now, with standard slot sizes, the film is fed through uniformly.

These were the main considerations in the reform of the film spool. Other incidental ones included a standard optical flat black finish to prevent reflection as light comes through on the film, and to provide uniformity in weight.

Standardization of film spools was not, and is not, however, the only work of Subcommittee 1 of Committee Z38. Among other factors studied are standardization of aperture openings, size of cut film and film packs, and other incidental items involved in aerial photography.

[1] Fairchild Camera and Instrument Corp.



This aerial photograph shows how the important Nazi railway junction at Creil, France, looked on March 28 while it was being blasted by more than 300 tons of bombs from formations of B-26 Marauder medium bombers of the Ninth Air Force.

Lord Woolton Elected President of British Standards Institution

THE British Standards Institution at its last annual meeting elected officers for 1945 as follows:

The Right Honorable Lord Woolton, C.H., P.C., *president*
Sir Percy Ashley, K.B.E., C.G., *vice-president*
Sir William Larke, K.B.E., *chairman*, General Council

Lord Woolton, leading British industrialist and Minister of Reconstruction, who served brilliantly as Minister of Food during the submarine blockade of 1940-1943, brings rare executive skill and a thorough understanding of the value of standardization work to his new post as president of the BSI.

At a recent BSI luncheon he stated that standardization was one of the basic principles of efficient production, that it insured the maximum value per unit of price, and protected consumers by guaranteeing a standard of quality of performance.

During his service on the British Government's leather control supply program in World War I, his design for a "poor man's boot" resulted in a popular sale of 3,000,000 pairs and the eventual development of a standard British boot.

At the outbreak of World War II, he was placed in charge of the Army clothing program and was raised to the peerage. In April 1940 he resigned all his directorships to serve as Minister of Foods, a task which he performed with such a high degree of efficiency that he was asked to take the office of Minister of Reconstruction. In this capacity he coordinated twelve Ministries in preparing a plan to rebuild England.

BSI War Standards Made Mandatory

In a brief report on the progress of the BSI war and peacetime program, Sir Percy Ashley, newly elected vice-president and retiring chairman of the General Council, stated that many of the war emergency standards developed by the BSI had been made mandatory by government orders. These war emergency standards included Air Raid Precautions materials, packaging schedules and codes (a packaging code for tropical climates is now in preparation), standards for steel and non-ferrous metals and other materials, tools and appliances, and schedules for clothing and hardware.

Peacetime work carried on in conjunction with the war emergency program included the preparation of standards for industrial and commercial materials and equipment.

Postwar reconstruction work underway includes the preparation of a substantial number of standards for building materials and equipment in cooperation with the house building program of the Ministries of Works and Health.

Predicts Increasing Demand for Standards

Summing up the outlook for the future, Sir Percy Ashley predicted an increasing demand for industrial standards, accurate trade descriptions, methods of sampling and testing, and standards of performance. If standards of this nature are to be generally acceptable, he said, they should be prepared and promulgated either by a governmental department or by an independent organization supported by private industry with government support but not under government control. Such an organization had been developed in the BSI, he said.

Sir Percy expressed appreciation of the work of C. LeMaistre who has retired after 40 years of official association with the BSI. Mr. LeMaistre, who had served as BSI director for many years, is now in charge of the London office of the United Nation Standards Committee.

War Standards "Suggested" for Women's Work Clothes

The War Production Board "suggests" that "wherever feasible" the American War Standards for women's industrial garments be used in the manufacture of work clothing for which materials are allocated under WPB Conservation Order M-328B. This order was issued June 1 to provide 1,320,000 items of women's work clothing during July, August, and September—clothing needed for women in war and "war-supporting" industries. Priorities assistance will be given manufacturers in obtaining supplies of the following materials for use in this program: Twill, drill and gabardine, jean cloth, flannel, corduroy, sheeting, mead's cloth, covert, seersucker, carded broadcloth, poplin, longcloth, and net. The clothing includes coveralls, slacks and slack suits, overalls, jackets, blouses and shirts, bib aprons, utility dresses, and hats and caps, and must meet the same specifications, including standards of quality and workmanship, as those used by the manufacturer for garments of the same price in 1943.

The American War Standards for Women's Industrial Clothing were prepared at the request of the OPA and WPB to provide serviceable clothing for women workers, designed with the use of the garment in mind and at the same time to assure economical use of materials. Clothing manufacturers, retailers, representatives of labor, safety engineers from war plants, and representatives of the OPA and WPB all took part in the work. The standards provide minimum specifications for design and quality of workmanship for slacks, dungarees, overalls and coveralls; bungalow aprons, and wrap-around and coat style dresses; jackets, shirts and aprons; and regular and princess model coat style dresses.

Recent Books Related to Standardization

Those interested in the study or the teaching of the technique of dimensional inspection may be interested in two recently published books in this field, each of which deals with a number of subjects covered by American Standards.

Essentials of Precision Inspection, by Wesley Mollard. McGraw-Hill Book Co., Inc., 1944; 207 pp. Price $3.00

This manual contains 12 chapters:

Inspection Tools and Gages;
Rules;
Micrometer Calipers;
Vernier Gages;
Checking Holes;
Knurling—Carburizing—Sandblasting;
Gage Blocks and Attachments;
Sine Bar;
Milling Cutters—Key Slots;
Threads;
Problems; and
Gears.

Problems to be solved by the student of the book to increase his

knowledge or skill in a given field are added to each chapter.

Precision Measurement in the Metal Working Industry, a textbook, in two volumes, prepared by the Department of Education of the International Business Machines Corporation and published by the Syracuse University Press (1944). Price, Vol. 1 $2.75; Vol. 2 $4.75

The first volume (263 pp) contains the following seven chapters:

Introduction (dealing with the fundamentals of linear measurement);
Non-Precision Line-Graduated Measuring Instruments;
Micrometer and Vernier Type Instruments;
Precision Gage Blocks;
Fixed Gages;
Thread Gages; and
Dial Gages and Test Indicators.

Volume Two (287 pp) has the following seven chapters:

Surface Plates and Accessories;
Angles;
Comparison Measurement;
Optical Instruments;
Measuring Machines;
Surface Roughness; and
Hardness Testing.

Each chapter is followed by a list of questions, so that the student may check on the extent to which he has absorbed the text.

Morgan Named Vice-President By Robert Hunt Company

Harold H. Morgan, chief engineer of the Robert W. Hunt Company, Chicago, and a member of the Board of Directors of the American Standards Association, has been elected vice-president of the Robert W. Hunt Company.

Mr. Morgan has served on the ASA Board of Directors since November 20, 1944 and is a member of the following ASA sectional committees: Code for Pressure Piping, B31; Standardization of Dimensions and Material of Wrought Iron and Wrought Steel Pipe and Tubing, B36; Building Code Requirements for Structural Steel, A57 and the Advisory Committee on Working Stresses of the Building Code Correlating Committee. Prior to becoming a member of the ASA Board of Directors, Mr. Morgan served for six years on the Standards Council.

James C. Ogden formerly president of the Robert W. Hunt Company has been elected chairman of the board.

Brazilian Military Mission Studies U. S. Standards

A BRAZILIAN military mission headed by General Alvaro Fiuza de Castro, Chief of the Ordnance Department of the Brazilian Army, and General Franklin Emilio Rodrigues, Commandant of the Brazilian Army Technical School, arrived in New York May 31. The mission had just completed a three-week tour of the factories and arsenals of the United States to obtain a close-up picture of American industry both from the production and service point of view. Since the Brazilian Expeditionary Force which has been fighting beside the Allies is complete equipped by the United States, the U. S. industrial set-up is of particular interest to Brazilian military authorities.

On its first day in New York, the mission met with representatives of the American Standards Association and the United Nations Standards Coordinating Committee to discuss the work that has aided our government in its production and supply problems during the war. In the months since Pearl Harbor the American Standards Association has completed 100 special jobs at the specific request of the Armed Forces and the War Production Board as well as carrying on its regular work, much of which has a direct bearing upon the war effort.

Presents Complete Set of Standards

P. G. Agnew, secretary of the American Standards Association, presented to the Brazilian mission a complete set of 800 American Standards developed through industry-government cooperation and used widely in this country. There was considerable discussion of the practical application of these standards in industry.

General Fiuza indicated that his party had enjoyed a fine opportunity for observing the work that is being done on standardization in America under the auspices of the American Standards Association. "Brazil is planning for direct cooperation in this standardization work through the United Nations Standards Committee in order that it may further the standardization of important products in its own country," said the General. Brazil's membership in the UNSCC is through the Associação Brasileira de Normas Tecnicas, the president of which is Dr. Ary F. Torres.

The mission consisted of the following Brazilian and American officers:

Brigadier General Alvaro Fiuza de Castro, Chief of Ordnance of the Brazilian Army and President of the Joint Brazil-U. S. Military Commission.
Lieutenant Adyr Fiuza de Castro, Aide to the General.
Brigadier General Franklin Emilio Rodrigues, Commandant of the Brazilian Army Technical School.
Lieutenant Dilio Lima Taborda, Aide.
Colonel Fausto Netto de Albuquerque, Director of the Brazilian Army Arsenal in Rio de Janiero.
Lieutenant Colonel Altair de Queiroz, Executive Officer to General Fiuza.
Major Charles E. Hollis, U. S. Army Liaison Officer with the Brazilian Ordnance Department.
Major Parker Berg, U. S. War Department representative.
First Lieutenant Richard O. Weber, U. S. War Department representative.

BSI Wants Uniform Terms for Steel Heat Treatment

The British Standards Institution has proposed that an international project on the standardization of terms used in the heat treatment of steel be carried on by the United Nations Standards Coordinating Committee.

The BSI stated that a recent review of American and British documents regarding heat-treatment terms revealed substantial agreement as to the meaning of the majority of these terms in general use but that there are several instances where terms have different meanings or where there is divergence in detail.

After having made its own survey of the situation, the BSI concluded that international harmony in matters of standards would not only be desirable but conceivably could be achieved. Accordingly it submitted the suggestion to the UNSCC. The American Standards Association has had this matter under consideration.

New Standards in ASA Library

(For new American Standards see page 167)

For the information of ASA Members, the American Standards Association gives here a selected list of standards received by the ASA Library last month. The list below includes only those standards which the ASA believes are of greatest interest to Members.

These standards may be consulted by Members at the ASA Library, or copies may be obtained from the organization issuing the standard. The address of the organization is included for your convenience in ordering.

Associations and Technical Societies

Society of Automotive Engineers (29 West 39 Street, New York 17, N. Y.)

Aeronautical Standard:

Dehydrator Plugs, Plastic AS 343

Aeronautical Recommended Practices:

Flange Driving, Fan, Rotor, Types 1, 2, 3, and 4 ARP 192
Heaters, Airplane, Internal Combustion Type ARP 143a
Hub, Fan Rotor, Types 1, 2, 3, and 4 ARP 193
Involute Spline Gages ARP 179
Valve Envelope, Hydraulic Relief, 3,000 Psi ARP 342

Aeronautical Information Reports:

Series, Air Corps 811 Series, Variation of Air Corps 811 Series, and NAF 310500 Series Fittings, Issued March 1, 1943, Report 1 25¢
Airplane Heating and Ventilating Equipment Engineering Data, Issued January 1, 1943, Report 2 35¢
Survey of Operating Practices with Propeller Ice Elimination Equipment, Issued March 1, 1943, Report 3 25¢
Oxygen Equipment for Aircraft, Report 4, Issued May 1, 1944 25¢
United States and British Commonwealth of Nations Aircraft Metals, Issued September 1, 1944, Report 8 $1.00
Testing of Aircraft Engine Carburetors, Issued February 1, 1934, Report 11 $1.50

Aeronautical Material Specifications, New and Revised:

Aluminum Alloy Tubing, Hydraulic, Magnesium Chromium, 528 AMS 4071
Aluminum Alloy Castings, Sand, 5 Silicon Aged, 355-T51 AMS 4210C
Aluminum Alloy Castings, Sand, 5 Silicon Solution and Precipitation, 355-T6 AMS 4212C
Aluminum Alloy Castings, Sand, 5 Silicon Solution and Overaged, 355-T71 AMS 4214B

Aeronautical Material Specifications (Continued)

Aluminum Alloy Castings, Sand, 7 Silicon Solution and Precipitation, 356-T6 AMS 4217A
Aluminum Alloy Castings, Sand, 4.5 Copper Solution and Precipitation, 195-T6 AMS 4231A
Aluminum Alloy Castings, Sand, Secondary 4 Copper Solution and Precipitation, S195-T6 AMS 4234A
Aluminum Bronze, Nickel Iron AMS 4640A
Brazing Alloy, Silver AMS 4770A
Cadmium Plating AMS 2400D
Protective Treatments for Magnesium Base Alloys AMS 2475A
Steel, Free Cutting, Manganese AMS 5022B
Steel Tubing, Corrosion Resistant, Seamless, 18 Chromium 8 Nickel AMS 5560A
Steel Tubing, Corrosion Resistant, Welded, 18 Chromium 8 Nickel AMS 5565A
Steel Tubing, Corrosion and Heat Resistant, Seamless, 18 Chromium 8 Nickel AMS 5570D
Steel Tubing, Corrosion and Heat Resistant, Welded, 18 Chromium 8 Nickel AMS 5575C
Steel Corrosion Resistant, 18 Chromium 8 Nickel, Free Machining AMS 5640B
Steel Corrosion and Heat Resistant, 18 Chromium 8 Nickel AMS 5645C
Steel Wire, Corrosion Resistant, Rivet Wire, 18 Chromium 10 Nickel, Annealed AMS 5686
Steel, Carburizing, 5 Ni (.08-.13C) AMS 6240C
Steel, Carburizing, 5 Ni (.15-.20C) AMS 6242C
Steel, Carburizing, 3.5 Ni 1.5 Cr (.07-.13C) AMS 6250D
Steel Carburizing, 3.5 Ni 1.5 Cr (.11-.17C) AMS 6253E
Steel, Carburizing, 3.5 Ni 1.5 Cr (.14-.20C) AMS 6254D
Steel, Carburizing, 3.25 Ni 1.2 Cr .1 Mo (.07-.13C) AMS 6260B
Steel, Carburizing, 3.25 Ni 1.2 Cr .1 Mo (.14-.20C) AMS 6264B
Steel, Carburizing, 3.25 Ni 1.2 Cr .1 Mo (.11-.17C) AMS 6263B
Steel, Carburizing, .55 Ni .5 Cr .2 Mo (.11-.17C) AMS 6270C
Steel, Carburizing, .55 Ni .5 Cr .2 Mo (.15-.20C) AMS 6272C
Steel, Carburizing, .55 Ni .5 Cr .2 Mo (.17-.22C) AMS 6274C
Synthetic Rubber Sponge, Soft AMS 3197B
Synthetic Rubber Sponge, Medium AMS 3198B
Synthetic Rubber Sponge, Firm AMS 3199B
Tolerances, Aluminum and Aluminum Alloy Bar, Rod and Shapes AMS 2201
Tolerances, Aluminum and Aluminum Alloy Sheet and Plate AMS 2202
Tolerances, Carbon Steel Bars AMS 2231
Tolerances, Carbon Steel Seamless Tubing AMS 2233
Tolerances, Stainless Steel Bars AMS 2241
Tolerances, Stainless Steel Seamless Tubing AMS 2243
Tolerances, Alloy Steel Bars AMS 2251
Tolerances, Alloy Steel Seamless Tubing AMS 2253

National Electrical Manufacturers Association (155 East 44th Street, New York 17, N. Y.)

List of NEMA Standards and Reports, June, 1945

Underwriters' Laboratories, Inc. (207 East Ohio Street, Chicago 11, Illinois)

Standard for Concrete Masonry Units, Subject 618, Second Edition, March, 1945

U. S. Government

(Wherever a price is indicated, the publication may be secured from the Superintendent of Documents, Government Printing Office, Washington, D. C. In other cases, copies may be obtained from the government agency concerned.)

Army Air Forces

List of Material and Process Specifications Bulletin No. 23, May, 1945

Federal Specifications Executive Committee (U. S. Treasury Department, Washington, D. C.)

Federal Specifications are prepared for use by all government departments and establishments in their purchases. Copies are available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. at 5 cents each. Requests should be accompanied by cash, check, or money order.

As a service to Company Members, the ASA maintains a sale file of all Federal Specifications. These specifications can be purchased from the ASA Sales Department.

Federal Specifications

Aprons, X-Ray; protective, lead-impregnated-rubber (natural and synthetic) (new) ZZ-A-621 June 15, 1945
Brass, Commercial-Yellow, High Copper-Yellow, and Naval; castings (Amendment 1) QQ-B-621a July 1, 1945
Bronze; castings (Amendment 1) QQ-B-691b July 1, 1945
Brushes; sash-tool (superseding H-B-491a, and E-H-B-491a, 5-12-42) June 15, 1945
Brushes; scrubbing, deck (Amendment 4) (sup. A-3, and E-H-B-531, 5-14-43) June 15, 1945
Brushes; stippling, wall (Amendment 1) (superseding E-H-B-636, 3-31-42) June 15, 1945
Brushes; whitewash (Amendment 1) (superseding E-H-B-731, 5-8-42) June 15, 1945
Calipers and Depth-Gages; micrometer (new) GGG-C-106 June 1, 1945
Cloth; abrasive, aluminum-oxide (Amendment 3) P-C-451 June 1, 1945
Couplings; hose, oil-suction and discharge (Amendment 2) (superseding Amendment 1 and E-WW-C-626, 8-6-42) June 15, 1945

Detergents, Special; (for aluminumware, dishwashing-machines, and manual cleaning (Amendment 3) P-D-236 June 1, 1945

Ether, petroleum; technical-grade (superseding O-E-751) O-E-751a June 15, 1945

Fittings; cable and conduit (Amendment 3) W-F-406 June 15, 1945

Hose; pneumatic, wrapped (Amendment 1) ZZ-H-499a

Insulation (Vegetable or Wood-Fiber); blanket, felt, and loose-fill (superseding HH-I-571 and E-HH-I-571, 5-8-42) HH-I-571a June 15, 1945

Insulation, Vermiculite; block and pipe covering (molded) (superseding HH-I-578 and E-HH-I-578, 6-10-42) HH-I-578a June 1, 1945

Lampholders (Sockets); medium-screw-shell, weatherproof (new) W-L-146 June 15, 1945

Leather and leather products; general specifications (methods of sampling, inspection, and tests) (new) KK-L-311 June 1, 1945

Magnesia; block, cement, and pipe-covering (molded) (superseding HH-M-61 and E-HH-M-61, 6-10-42) HH-M-61a June 15, 1945

Metal, antifriction; castings and ingots (superseding QQ-M-161, and E-QQ-M-161, 7-7-42) QQ-M-161a June 15, 1945

Metals; general specification for inspection of (Amendment 3) QQ-M-151a June 1, 1945

Packing; rubber, cloth-insertion (superseding HH-P-151a, and E-HH-P-151a, 4-3-43) HH-P-151b June 15, 1945

Paper; carbon, standard-weight (pencil) (new) UU-P-154 June 1, 1945

Paper; carbon, typewriter, black (superseding UU-P-151a and UU-P-156a, 5-21-35) UU-P-158 June 1, 1945

Racks; test-tube (new) LLL-R-53 June 15, 1945

Soap; grit, cake (Amendment 3) P-S-571a June 1, 1945

Soap, liquid and paste; (for) automobile, floor, and general cleaning (Amendment 4) P-S-598 June 1, 1945

Soap, Potash-Linseed-Oil; liquid and paste (for) floor and general cleaning (Amendment 2) P-S-603 June 1, 1945

Soap-Powder (Amendment 3) P-606a June 15, 1945

Sponges; surgical (all-gauze and gauze-and-cotton) (new) DDD-S-621 June 1, 1945

Sutures, Surgical; silk and nylon (Amendment 1) GG-S-816 June 15, 1945

Tape; rubber (and synthetic-rubber), insulating (superseding HH-T-111a and E-HH-T-111a, 7-1-43) HH-T-111b June 1, 1945

Tetrachlorethylene (perchlorethylene); technical-grade (new) O-T-236 June 1, 1945

Wire; copper, soft or annealed (superseding QQ-W-341) QQ-W-341a June 15, 1945

Wire, Steel; bookbinders' (Amendment 1) (superseding E-QQ-W-414, 8-24-42) QQ-W-414 June 1, 1945

National Bureau of Standards (Washington 25, D. C.)

Commercial Standards

Grading of Diamond Powder CS123-45 5¢

Stock Fir Doors, Recommended Revision of CS73-43

Tank Mounted Air Compressors CS126-45

Simplified Practice Recommendations

Carbon-Brush Terminals (Electric) R210-45 5¢

Cast Brass Solder-Joint Fittings R212-45

Pipes, Ducts, and Fittings for Warm Air Heating and Air Conditioning R207-45 10¢

Clay Sewer Pipe R211-45

War Production Board

Handbook of Standards for Describing Surplus Property 10¢

Section 6, Pulp and Paper, and Paperboard Products and Products of Printing and Publishing Industries

Section 7, Rubber Crude, Basic, and Finished Products—Natural and Synthetic

Section 8, Petroleum and Coal Crude and Basic Products

Seabury Dies, ASCE Head 20 Years

George T. Seabury, for 20 years executive head of the American Society of Civil Engineers, died May 25, 1945. He had suffered a coronary thrombosis from which he failed to rally. As secretary of the ASCE, oldest national engineering society and one of the founder bodies of the American Standards Association, he was prominent for two decades in all the technical circles in America. He was scheduled to retire from the office of secretary on June first and to assume special duties for the Society.

As national executive for the ASCE, assuming office on January 1, 1925, he served in a liaison capacity between the ASCE and the ASA. The ASCE became a Member Body of the ASA in 1928.

Mr. Seabury will be succeeded by Colonel William N. Carey, formerly of the Corps of Engineers, War Department and more recently chief engineer of the Federal Works Agency in Washington. Colonel Carey has been serving on the ASA Standards Council as a representative of the Federal Works Agency since January 1, 1943.

Electrical Committee for Engineering Standardization

The Edison Electric Institute, the Association of Edison Illuminating Companies, and the National Electrical Manufacturers Association have formed a Joint Conference Committee for Engineering Standardization for discussion of joint engineering standardization problems.

The committee will appoint subcommittees to handle specific technical programs.

New Standards from Other Countries

THE following new and revised standards, received recently by the American Standards Association from other countries, may be borrowed by ASA Members from the ASA Library or purchased through the Sales Department.

Great Britain

Drafts of Proposed British Standards

Clay Engineering Bricks CH (CLB) 242

Steel Spring Washers CH (ME) 152

Draft Revisions of British Standards

Cast Iron Spigot and Socket Flue or Smoke Pipes Ch (SF) 57

Reinforced Concrete Poles for Electrical Transmission and Traction Supports CH (CEB) 104

Canada

New Canadian Standards

Building Brick Made from Clay or Shale, Standard Specification for A82.1-1944 50¢

Sand-Lime Building Brick, Standard Specification for A82.3-1944 50¢

Standard Methods for Sampling and Testing Brick, A82.2-1944

Standard Methods for Sampling and Testing Structural Clay Tile, A82.6-1944

Structural Clay Non-Load-Bearing Tile, Standard Specification for A82.5-1944

Structural Clay Load-Bearing Wall Tile, Standard Specification for A82-4-1944

ASA Welcomes New Members

Nine new Company Members, one individual member, and one new Associate Member are welcomed to the American Standards Association. They are:

Company Members

American Viscose Corporation, Engineering Department, Wilmington, Delaware

Hugh E. Eby, Inc, Philadelphia, Pennsylvania

Electro-Voice Inc, South Bend, Indiana

Federal Telephone & Radio Corporation, New York City

General Panel Corporation, New York City

J. H. Keeney & Company, Inc, Chicago, Illinois

McInerney Spring & Wire Company, Grand Rapids, Michigan

Chas Schott Machine Company, Milwaukee, Wisconsin

Photo Products Department, E. I. du Pont de Nemours & Company, Wilmington, Delaware

Individual Member

H. A. Eysenbach, Jr, Philadelphia, Pennsylvania

Associate Member

The Veneer Association, Chicago, Illinois

ASA Standards Activities

American Standards

American Standards Available Since Our June Issue

For new American Standards available during the past month, see page 167. As a membership service, the American Standards Association offers its Members one copy of each newly approved American Standard and American War Standard for the first $50 of annual membership, and an additional copy for each $100 beyond this. Only one person in each company is authorized to return the list requesting these copies. If you would like to have any of these new standards, we suggest you get in touch with your company's authorized representative. When your company's quota is filled, additional copies can be ordered at 20 percent discount to Members.

American Standards Approved Since Our June Issue

Building Code Requirements for Minimum Design Loads in Buildings and Other Structures, A58.1-1945

Sponsor: National Bureau of Standards, U.S. Department of Commerce

Building Code Requirements for Reinforced Gypsum Concrete, A59.1-1945

Sponsors: Building Officials Conference of America; Gypsum Association

Standards Being Considered by ASA for Approval

Pipe Threads, Revision of B2.1-1942

Sponsors: American Gas Association; American Society of Mechanical Engineers

American War Standards

American War Standards Available Since Our June Issue

For new American War Standards available during the past month, see page 167.

American War Standards Approved Since Our June Issue

Projection Screens (Mounted on Rope- and Pulley-Operated Springless Rollers), Z52.57-1945

Safety Code for the Industrial Use of X-Rays, Z54.1-1945, Part 1

War Standards Under Way

Cylindrical Fits, B4.1

Manual of Standard Drawing Practice, Z55

Linemen's Rubber Protective Equipment
- Rubber Insulating Line Hose, J6.1
- Rubber Insulator Hoods, J6.2
- Leather Protector Gloves, J6.3
- Rubber Insulating Blankets, J6.4
- Linemen's Rubber Sleeves, J6.5

Machine Tool Electrical Standards (Revision of C74-1942)

Photography and Cinematography, Z52

Motion Picture Cameras
- Distance Calibration of 16-Mm Motion Picture Camera Lenses, Z52.51
- Field of View of 16-Mm Motion Picture Camera View Finders Having Parallax Adjustment, Z52.49
- Mounting Dimensions for 16-Mm Camera and Recorder Film Magazines (400-Foot Gear-Driven Type), Z52.52
- Mounting Dimensions for 16-Mm Camera and Recorder Magazines (200-Foot Belt-Driven Type), Z52.66
- Mounting Dimensions for 16-Mm Camera and Recorder Magazines (400-Foot Belt-Driven Type), Z52.67
- Photographing Aperture of 16-Mm Sound Motion Picture Cameras, Z52.47
- Photographing Aperture of 16-Mm Silent Motion Picture Cameras, Z52.48
- Registration Distance and Mounting Dimensions of 16-Mm Motion Picture Camera Lenses, Z52.50

Motion Picture Projection Equipment
- Class II Service Model 16-Mm Sound Motion Picture Projection Equipment, Specification for, Z52.13
- Projection Screens (Mounted on Spring Rollers), Specification for, Z52.56
- Projection Screens (Folding, for Portable-Frame Mounting), Z52.58
- Projection Screens (Auditorium-Frame Mounting), Z52.59

Motion Picture Release Prints
- Leaders, Cues, and Trailers for 16-Mm Sound Motion Picture Release Prints Processed from Original 16-Mm Material, Z52.31
- Picture and Sound Synchronization Marks for 35-Mm and 16-Mm Sound Motion Picture Release Negatives and Other Preprint Material, Z52.53
- Printer Loss in 16-Mm Sound Motion Picture Prints, Method of Determining, Z52.40

Motion Picture Test Films
- Warble Test Film Used for Testing 16-Mm Sound Motion Picture Equipment, Specification for, Z52.32
- Photographic Filter Terminology and Nomenclature, Z52.61

Still Cameras
- Exposure Markings for Between-the-Lens Shutters, Z52.62
- Exposure Markings for Focal Plane Shutters, Z52.64
- Exposure Time of Focal Plane Shutters, Method of Determining, Z52.65
- Performance Characteristics of Between-the-Lens Shutters, Method of Determining, Z52.63

Still Printing Equipment
- Contact Printer, Photographic, Specification for, Z52.18
- Enlarger, Photographic, Specification for, Z52.23

Protective Occupational (Safety) Clothing, L18
- Gloves to Provide Protection Against Chemicals

Radio, Noise, Methods of Measuring, C63

Safety Color Code for Marking Physical Hazards, Z53

Screw Threads, B1
- High-Duty Studs in Light Alloys
- Instrument Threads
- Stub Acme Threads
- Unification of Screw Threads

News About ASA Projects

Chemical-Resistant Gloves, L18.29—

At a joint meeting of the Subgroup and the Subcommittee on Hand Protection of the L18 War Committee on Protective Occupational (Safety) Clothing, June 20, a draft specification for chemical-resistant gloves was revised, discussed and presented to the L18 War Committee for final action.

As a result of this meeting, a new American War Standard for Chemical-Resistant Gloves, L18.29, has been sent to the Safety Code Correlating Committee and will be submitted for eventual approval by the Chairman of the Standards Council, according to war procedure.

Safety Code for Industrial Use of X-Rays, Z54

A meeting of the War Committee will be held July 19 at which the committee will consider proposals for additional parts of the code. Part 1 has already been approved and published. The subcommittees on Electrical Protection and on Protective Methods and Materials have already produced preliminary drafts and other committees are expected to be prepared to report on work which has been under way since the last meeting on March 1.

State Authorizes Use of Building Codes by Reference

New Hampshire cities will be permitted to utilize as a local ordinance any recognized national code dealing with building construction matters and fire extinguishing equipment by reference to the code rather than through the former procedure of complete publication, according to a law recently adopted by the New Hampshire State Legislature, A. C. Hudson of the State Board of Underwriters reports.

Printed copies must be made available for public reference, the law stipulates, but complete newspaper publication of code provisions is no longer required.

NEW X-RAY SAFETY CODE, WELDING SPECIFICATIONS INCLUDED IN STANDARDS AVAILABLE THIS MONTH

VITAL to the safety of the increasing number of workers who are using x-ray in checking equipment and materials in industry, as well as in diagnosis and treatment of disease, is the Safety Code for the Industrial Use of X-Rays. Part 1 of this standard is available from the American Standards Association this month. The first comprehensive specifications for resistance-welding machines and controls and for resistance-welding electrodes and electrode holders are among the new standards.

Additional standards in the series for photographic equipment, including projection equipment and films, and a list of revised standards for pipe and tubing are also included.

American Standards Association • ASA • 70 East 45th Street, New York 17, N. Y.

No. of Copies	ASA Number	Sponsor's Number	Title of Standard	Price
.....	B36.1-1945	ASTM A53-44	**Welded and Seamless Steel Pipe,** Specifications for	.25
.....	B36.5-1945	ASTM A135-44	**Electric-Resistance-Welded** Steel Pipe, Specifications for	.25
.....	B36.12-1945	ASTM A83-44	**Lap-Welded and Seamless Steel** and Lap-Welded Iron Boiler Tubes, Specifications for	.25
.....	B36.13-1945	ASTM A178-44	**Electric-Resistance-Welded Steel** and Open-Hearth Iron Boiler Tubes, Specifications for	.25
.....	B36.14-1945	ASTM A192-44	**Seamless Steel Boiler Tubes** for High-Pressure Service, Specifications for	.25
.....	B36.15-1945	ASTM A210-44	**Medium-Carbon Seamless Steel** Boiler and Superheater Tubes, Specifications for	.25
.....	B36.16-1945	ASTM A211-44	**Spiral-Welded Steel** or Iron Pipe, Specification for	.25
.....	B36.17-1945	ASTM A213-44	**Seamless Alloy-Steel Boiler** and Superheater Tubes, Specifications for	.25
.....	B36.18-1945	ASTM A226-44	**Electric-Resistance-Welded Steel** Boiler and Superheater Tubes for High-Pressure Service, Specifications for	.25
.....	C5.3-1944		**Protection of Structures** Containing Flammable Liquids and Gases (included with C5.1-1937 and C5.2-1937)	.20
.....	C52.3-1945		**Straight and Offset Resistance-Welding** Electrodes and Electrode Holders (American War Standard)	.30
.....	C52.4-1945		**Controls for Resistance-Welding** Machines (American War Standard)	.25
.....	C52.5-1945		**Resistance-Welding Machines,** Specifications for (American War Standard)	.40
.....	Z11.53-1944	ASTM D666-44	**Conversion of Kinematic Viscosity** to Saybolt Furol Viscosity, Method for	.25
.....	Z38.3.2-1945		**Films for Permanent Records,** Specifications for	.30
.....	Z38.7.15-1945		**Slidefilm Projectors,** Specifications for	.10
.....	Z38.8.4-1945		**Dimensions for Bite** of Film Clips	.10
.....	Z52.1-1944		**Projection Equipment,** Sound Motion Picture, 16-mm, Class I (American War Standard) (JAN-P-49)	Gratis
.....	Z52.34-1945		**Reel Spindles** for 16-mm Motion Picture Projectors (American War Standard)	.10
.....	Z52.46-1945		**Brightness Characteristics** of Projection Screens (Semi-Diffusing Reflecting Surface) (American War Standard)	.10
.....	Z52.43-1944		**Photographic Flash Lamps,** including Supplement Z52.43a (Federal Specications W-L-122 and Supplement) (American War Standard)	.10
.....	Z54.1-1945		**Industrial Use of X-Rays,** Part I, Safety Code for the (American War Standard)	.25

ASA COMPANY MEMBERS *are entitled to* ***one free copy of each*** *newly approved American Standard for the first $50 of annual membership, and an additional copy for each $100 beyond this. These standards can be obtained through your company representative. We will be glad to give you his name, if necessary.*

1st Safety Standard for Use of X-Rays

X-RAYS

EVERY potential user of x-rays for radiography and fluoroscopy should have this important safety standard. Prepared under the war procedure to meet an existing need, Part I, now available, is the first approved standard concerned with the safety procedure for the installation, operation, use, and maintenance of industrial x-ray equipment. It applies to all x-ray apparatus except that used for medical or dental purposes. For ready reference, get your copy *now!*

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Safety Code for the Industrial Use of X-Rays

An American War Standard Z54.1-1945

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